CIVIL AVIATION AUTHORITY OF FIJI

ADOPTION OF AMENDMENT 82 TO ANNEX 3 - Meteorological Service for International Air Navigation

[1]Document Affected : SD-Aeronautical Meteorological Service Provider Edition 4.0

Adopted Date of the ICAO SARPS Amendment : 17 March 2025

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Effective Date of the Amendment : 04 August 2025

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Applicable Date of the Amendment : 27 November 2025

Purpose of the Proposed Amendment: Amendment 82 arises from recommendations developed by fifth meeting of the Meteorology Panel (METP/5) concerning the restructured Annex 3, space weather information services, quantitative volcanic ash information and the international airways volcano watch (IAVW), the ICAO meteorological information exchange model (IWXXM), the world area forecast system (WAFS), and improved definition of meteorological authority and introduction of a new definition of meteorological service provider.

Details of the Proposed Amendment: Amendment 82 to Annex 3 is intended to:

a) develop the restructured Annex 3 to facilitate the migration of the provision of aeronautical meteorological information from a "product-centric" to an "information-based" environment under the system-wide information management (SWIM), and the evolution of the provision of aeronautical meteorological service in line with the Global Air Navigation Plan (GANP). The restructuring also provides clearer separation of performance and functional requirements in Annex 3 from the technical specifications to be transferred to the PANS-MET;

b) update existing provisions regarding space weather information services;

c) introduce quantitative volcanic ash information, based on enhanced capabilities of quantitative monitoring and dispersion modelling of volcanic ash;

d) introduce the issuance of volcanological notice for aviation (VONA) as a Recommended Practice;

e) further develop IWXXM;

f) further develop WAFS; and

g) improve the definition of meteorological authority and introduce a new definition of meteorological service provider.

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[1] *NB: This Cover-Page which is intended for the industry-consultation phase only, will be removed during the finalisation of the SD for issue.*

STANDARDS DOCUMENT

Aeronautical Meteorological Service Provider

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PREFACE

General

Fiji's National Aviation Law consists of a three-tier regulatory system, comprising Acts, Regulations and Standards Documents; the purpose of which is to ensure, compliance and conformance with the International Civil Aviation Organisation (ICAO) Standards and Recommended Practices (SARPS).

The three-tier regulatory system represents Fiji's Primary Legislation System and Specific Operating Regulations to meet Critical Elements CE1 and CE2 of ICAO's Eight Critical Element of a safety oversight system.

Standards Documents (SD) are issued by the Civil Aviation Authority of Fiji (CAAF), the Authority, under the provision of Section 14 (3) (b) of the Civil Aviation Authority Act 1979 (CAP 174A).

Where appropriate, the SD also contains guidance information (Critical Element CE5) on standards, practices, and procedures that are acceptable to the Authority.

Notwithstanding the above, and where specifically indicated in this Standards Document that such a provision is available, consideration may be given to other methods of compliance that may be presented to the Authority provided they have compensating factors that can demonstrate a level of safety equivalent to or better than those prescribed herein. Accordingly, the Authority will consider each case based on its own merits holistically in the context of and relevancy of the alternative methods to the individual applicant.

When new standards, practices, or procedures are determined to be acceptable to the Authority, they will be added to this document.

Purpose

This Standards Document – Aeronautical Meteorological Service Provider is issued by the Civil Aviation Authority of Fiji pursuant to Air Navigation Regulation 145D. This Document is intended for use by CAAF, applicants for, and holders of, an Aeronautical Meteorological Service Provider and their staff.

Change Notice

This Standards Document has been developed pursuant to the Authority's obligation to provide oversight on aeronautical meteorological service providers and their personnel and service providers obligation to comply with standards notified by the Authority and is the means by which such notification is given.

AMENDMENTS

The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS			
No.	Date applicable	Date entered	Entered by
1	Incorporated in this Edition (initial issue up to Edition 4.0)		
2	27 Nov 2025	04 Aug 2025	CAAF

CORRIGENDA			
No.	Date of issue	Date entered	Entered by

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Table A. Amendments to SD-AMSP

The Civil Aviation Reform Act (1999) requires the Authority to produce standards and recommended practices for the provision of Meteorological Service for International Air Navigation. The Standards Document – Aeronautical Meteorological Service Provider (SD-AMSP) details the standards and recommended practices for the provision of Aeronautical Meteorological Service Provider, within Fiji and its designated areas of responsibility, in compliance with ICAO Annex 3 - Meteorological Service for International Air Navigation.

Amendment(s)	*Source(s)*	*Subject(s)*	*Adopted/approved*[2] *Effective Applicable*
Edition 1.0	CAAF	Initial Issue	10 Jun 2016
Edition 2.0	CAAF	Incorporation of ICAO Annex 3 amendments (up to and including Amendment 77)	30 Jun 2019
Edition 3.0	CAAF	Incorporation of ICAO Annex 3 amendments (up to and including Amendment 79)	05 Nov 2020
Edition 4.0	CAAF	CAAF Rebranding (Q4 2024) Removal of Safety Management Systems References. All SMS references are changed to reflect Quality Management Systems (QMS) for the AMSP. Incorporation of ICAO Annex 3 Amendment (up to and including amendment 81)	18 Mar 2024 14 Jan 2025 28 Nov 2024
Edition 4.1	CAAF	Adoption of ICAO Annex 3 document format and structure Incorporation of ICAO Annex 3 Amendment 82	02 Apr 2025 04 Aug 2025[3] 27 Nov 2025 26 Nov 2026

[2] *To ensure consistency with ICAO defined timelines, with effect from SD-AMSP Edition 4.0, timelines for the Adopted/Approved. Effective and Applicable dates are listed.*

[3] *Effective date listed is the ICAO State-Letter Adoption of Amendment, defined Effective date for the Amendment to ICAO Annex 3.*

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

CHAPTER 1. DEFINITIONS

Note 1.— The designation (RR) in these definitions indicates a definition which has been extracted from the Radio Regulations of the International Telecommunication Union (ITU) (see Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including Statement of Approved ICAO Policies *(Doc 9718)).*

Note 2.— These Standards and Recommended Practices are to be used in conjunction with the Procedures for Air Navigation Services — Meteorology (PANS-MET, Doc 10157).

1.1 Definitions

When the following terms are used in the Standards Documents Aeronautical Meteorological Service Provider (SD-AMSP), they have the following meanings:

Aerodrome. A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aerodrome climatological summary. Concise summary of specified meteorological elements at an aerodrome, based on statistical data.

Aerodrome climatological table. Table providing statistical data on the observed occurrence of one or more meteorological elements at an aerodrome.

Aerodrome control tower. A unit established to provide air traffic control service to aerodrome traffic.

Aerodrome meteorological office. An office designated to provide meteorological service for aerodromes serving international air navigation.

Aerodrome reference point. The designated geographical location of an aerodrome.

Aeronautical fixed service (AFS). A telecommunication service between specified fixed points provided primarily for the safety of air navigation and for the regular, efficient and economical operation of air services.

Aeronautical fixed telecommunication network (AFTN). A worldwide system of aeronautical fixed circuits provided, as part of the aeronautical fixed service, for the exchange of messages and/or digital data between aeronautical fixed stations having the same or compatible communications characteristics.

Aeronautical meteorological station. A station designated to make observations and meteorological reports for use in international air navigation.

Aeronautical Meteorological service provider. The relevant entity designated to provide meteorological service for international air navigation on behalf of Fiji.

Aeronautical mobile service (RR S1.32). A mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate; emergency position-indicating radio beacon stations may also participate in this service on designated distress and emergency frequencies.

Aeronautical telecommunication station. A station in the aeronautical telecommunication service.

Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Aircraft observation. The evaluation of one or more meteorological elements made from an aircraft in flight.

AIRMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of low-level aircraft operations and which was not already included in the forecast issued for low-level flights in the flight information region concerned or sub-area thereof.

Air-report. A report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting.

Note.— Details of the AIREP form are given in the PANS-ATM (Doc 4444).

Air traffic services unit. A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.

Alternate aerodrome. An aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at the aerodrome of intended landing where the necessary services and facilities are available, where aircraft performance requirements can be met and which is operational at the expected time of use. Alternate aerodromes include the following:

Take-off alternate. An alternate aerodrome at which an aircraft would be able to land should this become necessary shortly after take-off and it is not possible to use the aerodrome of departure.

En-route alternate. An alternate aerodrome at which an aircraft would be able to land in the event that a diversion becomes necessary while en route.

Destination alternate. An alternate aerodrome at which an aircraft would be able to land should it become either impossible or inadvisable to land at the aerodrome of intended landing.

Note.— The aerodrome from which a flight departs may also be an en-route or a destination alternate aerodrome for that flight.

Altitude. The vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL).

Approach control unit. A unit established to provide air traffic control service to controlled flights arriving at, or departing from, one or more aerodromes.

Appropriate ATS authority. The relevant authority designated by Fiji responsible for providing air traffic services in the airspace concerned.

Area control centre (ACC). A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

Automatic dependent surveillance — contract (ADS-C). A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports.

Note.— The abbreviated term "ADS contract" is commonly used to refer to ADS event contract, ADS demand contract, ADS periodic contract or an emergency mode.

Briefing. Oral commentary on existing and/or expected meteorological conditions.

Cloud of operational significance. A cloud with the height of cloud base below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, or a cumulonimbus cloud or a towering cumulus cloud at any height.

Consultation. Discussion with a meteorologist or another qualified person of existing and/or expected meteorological conditions relating to flight operations; a discussion includes answers to questions.

Control area (CTA). A controlled airspace extending upwards from a specified limit above the earth.

Cruising level. A level maintained during a significant portion of a flight.

Flight crew member. A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

Flight documentation. Written or printed documents, including charts or forms, containing meteorological information for a flight.

Flight information centre (FIC). A unit established to provide flight information service and alerting service.

Flight information region (FIR). An airspace of defined dimensions within which flight information service and alerting service are provided.

Flight level. A surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

Note 1.— A pressure type altimeter calibrated in accordance with the Standard Atmosphere:

a) when set to a QNH altimeter setting, will indicate altitude;

b) when set to a QFE altimeter setting, will indicate height above the QFE reference datum;

c) when set to a pressure of 1 013.2 hPa, may be used to indicate flight levels.

Note 2.— The terms "height" and "altitude", used in Note 1, indicate altimetric rather than geometric heights and altitudes.

Forecast. A statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace.

GAMET area forecast. An area forecast in abbreviated plain language for low-level flights for a flight information region or sub-area thereof, prepared by the meteorological office designated by the meteorological authority concerned and exchanged with meteorological offices in adjacent flight information regions, as agreed between the meteorological authorities concerned.

Grid point data in digital form. Computer processed meteorological data for a set of regularly spaced points on a chart, for transmission from a meteorological computer to another computer in a code form suitable for automated use.

Note.— In most cases, such data are transmitted on medium- or high-speed telecommunications channels.

Height. The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

Human Factors principles. Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

ICAO meteorological information exchange model (IWXXM). A data model for representing aeronautical meteorological information.

International airways volcano watch (IAVW). International arrangements for monitoring volcanic activity and providing notices, forecasts and warnings to aircraft of volcanic ash in the atmosphere.

Note.— The IAVW is based on the cooperation of aviation and non-aviation operational units using information derived from observing sources and networks that are provided by States. The watch is coordinated by ICAO with the cooperation of other concerned international organizations.

Level. A generic term relating to the vertical position of an aircraft in flight and meaning variously height, altitude or flight level.

Meteorological authority. The entity arranging for the provision of meteorological service for international air navigation on behalf of Fiji and providing regulation and oversight of the meteorological service.

Meteorological bulletin. A text comprising meteorological information preceded by an appropriate heading.

Meteorological information. Meteorological report, analysis, forecast, and any other statement relating to existing or expected meteorological conditions.

Meteorological office. An office designated to provide meteorological service for international air navigation.

Meteorological report. A statement of observed meteorological conditions related to a specified time and location.

Meteorological satellite. An artificial Earth satellite making meteorological observations and transmitting these observations to Earth.

Meteorological watch office (MWO). An office designated to provide information concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations within its specified area of responsibility.

Minimum sector altitude (MSA). The lowest altitude which may be used which will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 NM) radius centred on a significant point, the aerodrome reference point (ARP) or the heliport reference point (HRP).

Observation (meteorological). The evaluation of one or more meteorological elements.

Operational control. The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of the flight.

Operational flight plan. The operator's plan for the safe conduct of the flight based on considerations of aeroplane performance, other operating limitations and relevant expected conditions on the route to be followed and at the aerodromes concerned.

Operator. The person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Pilot-in-command. The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

Prevailing visibility. The greatest visibility value, observed in accordance with the definition of "visibility", which is reached 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.

Prognostic chart. A forecast of a specified meteorological element(s) for a specified time or period and a specified surface or portion of airspace, depicted graphically on a chart.

Quality assurance. Part of quality management focused on providing confidence that quality requirements will be fulfilled (ISO 9000[4]).

Quality control. Part of quality management focused on fulfilling quality requirements (ISO 9000*).

[4] ISO Standard 9000 — Quality Management Systems — Fundamentals and Vocabulary.

Quality management. Coordinated activities to direct and control an organization with regard to quality (ISO 9000*).

Regional air navigation agreement. Agreement approved by the Council of ICAO normally on the advice of a regional air navigation meeting.

Rescue coordination centre. A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.

Runway. A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

Runway visual range (RVR). The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

Search and rescue services unit. A generic term meaning, as the case may be, rescue coordination centre, rescue subcentre or alerting post.

SIGMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations.

Space weather centre (SWXC). A global or regional centre designated by ICAO to monitor and provide advisory information on space weather phenomena expected to affect high-frequency radio communications, communications via satellite, GNSS-based navigation and surveillance systems and/or pose a radiation risk to aircraft occupants, under the framework of space weather information service.

Note. — A regional centre designated by ICAO supports global centres in the fulfilment of its responsibilities.

Space weather information service. A globally coordinated service where space weather centres provide information on space weather phenomena that may affect communications, navigation and surveillance systems and/or pose a radiation risk to aircraft occupants.

State volcano observatory. A volcano observatory, designated by regional air navigation agreement, to monitor active or potentially active volcanoes within a State and to provide information on volcanic activity and/or volcanic ash in the atmosphere.

Threshold. The beginning of that portion of the runway usable for landing.

Touchdown zone. The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

Tropical cyclone. Generic term for a non-frontal synoptic-scale cyclone originating over tropical or sub-tropical waters with organized convection and definite cyclonic surface wind circulation.

Tropical cyclone advisory centre (TCAC). A meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, world area forecast centres and international OPMET databanks regarding the position, forecast direction and speed of movement, central pressure and maximum surface wind of tropical cyclones.

Visibility. Visibility for aeronautical purposes is the greater of:

a) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognized when observed against a bright background;

b) the greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background.

Note.— The two distances have different values in air of a given extinction coefficient, and the latter b) varies with the background illumination. The former a) is represented by the meteorological optical range (MOR).

Volcanic ash advisory centre (VAAC). A meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, area control centres, flight information centres, world area forecast centres and international OPMET databanks regarding the lateral and vertical extent and forecast movement of volcanic ash in the atmosphere.

VOLMET. Meteorological information for aircraft in flight.

Data link-VOLMET (D-VOLMET). Provision of current aerodrome routine meteorological reports (METAR) and aerodrome special meteorological reports (SPECI), aerodrome forecasts (TAF), SIGMET, special air-reports not covered by a SIGMET and, where available, AIRMET via data link.

VOLMET broadcast. Provision, as appropriate, of current METAR, SPECI, TAF and SIGMET by means of continuous and repetitive voice broadcasts.

World area forecast centre (WAFC). A meteorological centre designated to prepare and issue significant weather forecasts and upper-air forecasts in digital form on a global basis direct to States using the aeronautical fixed service Internet- based services.

World area forecast system (WAFS). A worldwide system by which world area forecast centres provide aeronautical meteorological en-route forecasts in uniform standardized formats.

1.2 Terms used with a limited meaning

For the purpose of this Standards Document, the following terms are used with a limited meaning as indicated below:

a) “provide” is used solely in connection with the provision of service;

b) “issue” is used solely in connection with cases where the obligation specifically extends to sending out the information to a user;

c) “make available” is used solely in connection with cases where the obligation ends with making the information accessible to a user; and

d) “supply” is used solely in connection with cases where either b) or c) applies.

CHAPTER 2. GENERAL PROVISIONS

2.1 Objective, determination and provision of meteorological service

2.1.1 The objective of meteorological service for international air navigation shall be to contribute towards the safety, regularity and efficiency of international air navigation.

2.1.2 This objective shall be achieved by supplying the following users: operators, flight crew members, air traffic services units, search and rescue services units, airport managements and others concerned with the conduct or development of international air navigation, with the meteorological information necessary for the performance of their respective functions.

2.1.3 The Fiji shall determine the meteorological service which it will provide to meet the needs of international air navigation. This determination shall be made in accordance with the provisions of this Standards Document and in accordance with regional air navigation agreement; it shall include the determination of the meteorological service to be provided for international air navigation over international waters and other areas which lie outside Fiji.

2.1.4 Fiji has designated the Civil Aviation Authority of Fiji (CAAF), hereinafter referred to as the meteorological authority, to arrange for the provision of meteorological service for international air navigation on its behalf. Details of the Civil Aviation Authority of Fiji shall be included in the Fiji AIP, in accordance with Standards Document-Aeronautical Information Service (SD-AIS), Chapter 5.

2.1.5 Fiji has designated the meteorological service provider, hereinafter referred to as the Aeronautical Meteorological Service Provider (AMSP), to provide meteorological service for international air navigation on behalf of Fiji. Details of the aeronautical meteorological service provider shall be included in the Fiji AIP, in accordance with SD-AIS, Chapter 5.

Note.— Detailed specifications concerning presentation and contents of the aeronautical information publication is provided in the Procedures for Air Navigation Services — Aeronautical Information Management *(PANS-AIM, Doc 10066), Appendix 2.*

2.1.6 The Aeronautical Meteorological Service Provider (AMSP) shall comply with the requirements of the World Meteorological Organization (WMO) in respect of qualifications, competencies, education and training of meteorological personnel providing service for international air navigation.

Note.— Requirements concerning the qualifications, competencies, education and training of meteorological personnel in aeronautical meteorology are given in the Technical Regulations *(WMO-No. 49), Volume I —* General Meteorological Standards and Recommended Practices*, Part V —* Qualifications and Competencies of Personnel Involved in the Provision of Meteorological (Weather and Climate) and Hydrological Services, *Part VI —* Education and Training of Meteorological Personnel, *and Appendix A —* Basic Instruction Packages.

2.2 Supply, use, quality management and interpretation of meteorological information

2.2.1 Close liaison shall be maintained between those concerned with the supply and those concerned with the use of meteorological information on matters which affect the provision of meteorological service for international air navigation.

2.2.2 The Aeronautical Meteorological Service Provider (AMSP)shall establish and implement 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 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 quality management systems is given in the Guide to the Implementation of Quality Management Systems for National Meteorological and Hydrological Services and Other Relevant Service Providers *(WMO-No. 1100).*

2.2.4 **Recommendation.**— *The quality system should provide the users with assurance that the meteorological information supplied complies with the stated requirements in terms of the geographical and spatial coverage, format and content, time and frequency of issuance and period of validity, as well as the accuracy of measurements, observations and forecasts. When the quality system indicates that meteorological information to be supplied to the users does not comply with the stated requirements, and automatic error correction procedures are not appropriate, such information should not be supplied to the users unless it is validated with the originator.*

Note.— Requirements concerning the geographical and spatial coverage, format and content, time and frequency of issuance and period of validity of meteorological information to be supplied to aeronautical users are contained in Chapters 3, 4, 6, 7, 8, 9 and 10 of this SD, Chapters 2, 4, 5, 6, 7, 8 and 9 of the PANS-MET (Doc 10157) and the relevant regional air navigation plans. Guidance concerning the accuracy of measurement and observation, and accuracy of forecasts is contained in Attachments A and B, respectively, to the PANS-MET..

2.2.5 **Recommendation.**— *In regard to the exchange of meteorological information for operational purposes, the quality system should include verification and validation procedures and resources for monitoring adherence to the prescribed transmission schedules for individual messages and/or bulletins required to be exchanged, and the times of their filing for transmission. The quality system should be capable of detecting excessive transit times of messages and bulletins received.*

Note.— Requirements concerning the exchange of operational meteorological information are contained in Chapter 11 of this SD and Chapter 10 of the PANS-MET (Doc 10157).

2.2.6 Demonstration of compliance of the quality system applied shall be by audit. If non-conformity of the system is identified, action shall be initiated to determine and correct the cause. All audit observations shall be evidenced and properly documented.

2.2.7 Owing to the variability of meteorological elements in space and time, to limitations of observing techniques and to limitations caused by the definitions of some of the elements, the specific value of any of the elements given in a report shall be understood by the recipient to be the best approximation of the actual conditions at the time of observation.

Note.— Guidance on the operationally desirable accuracy of measurement or observation is contained in Attachment A to the PANS-MET (Doc 10157).

2.2.8 Owing to the variability of meteorological elements in space and time, to limitations of forecasting techniques and to limitations caused by the definitions of some of the elements, the specific value of any of the elements given in a forecast shall be understood by the recipient to be the most probable value which the element is likely to assume during the period of the forecast. Similarly, when the time of occurrence or change of an element is given in a forecast, this time shall be understood to be the most probable time.

Note.— Guidance on the operationally desirable accuracy of forecasts is contained in Attachment B to the PANS-MET (Doc 10157).

2.2.9 The meteorological information supplied to the users listed in 2.1.2 shall be consistent with Human Factors principles and shall be in forms which require a minimum of interpretation by these users, as specified in the following chapters.

Note.— Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual *(Doc 9683).*

2.2.10 **Recommendation.**— *The Aeronautical Meteorological Service Provider (AMSP) should ensure that the*

meteorological information supplied to the users listed in 2.1.2 is provided through information services.

Note 1.— In the context of system-wide information management (SWIM), the notion of information service addresses machine-to-machine interaction in a service-oriented architecture.

Note 2.— Procedures on information services are contained in the Procedures for Air Navigation Services — Information Management *(PANS-IM, Doc 10199).*

Note 3.— Guidance material on information services can be found in the Manual on System-wide Information Management Implementation *(Doc 10203).*

2.3 Notifications required from operators

2.3.1 An operator requiring meteorological service or changes in existing meteorological service shall notify, sufficiently in advance, the Aeronautical Meteorological Service Provider (AMSP). The minimum amount of advance notice required shall be as agreed between the aeronautical meteorological service provider and the operator concerned.

2.3.2 The Aeronautical Meteorological Service Provider (AMSP) shall be notified by the operator requiring service when:

a) new routes or new types of operations are planned;

b) changes of a lasting character are to be made in scheduled operations; and

c) other changes, affecting the provision of meteorological service, are planned.

Such information shall contain all details necessary for the planning of appropriate arrangements by the aeronautical meteorological service provider.

2.3.3 The operator or a flight crew member shall ensure that, where required by the Aeronautical Meteorological Service Provider (AMSP), the aerodrome meteorological office concerned is notified:

a) of flight schedules;

b) when non-scheduled flights are to be operated; and

c) when flights are delayed, advanced or cancelled.

2.3.4 **Recommendation.**— *The notification to the aerodrome meteorological office of individual flights should contain the following information except that, in the case of scheduled flights, the requirement for some or all of this information may be waived as agreed between the aerodrome meteorological office and the operator concerned:*

a) aerodrome of departure and estimated time of departure;

b) destination and estimated time of arrival;

c) route to be flown and estimated times of arrival at, and departure from, any intermediate aerodrome(s);

d) alternate aerodromes needed to complete the operational flight plan and taken from the relevant list contained in the regional air navigation plan;

e) cruising level;

f) type of flight, whether under visual or instrument flight rules;

g) type of meteorological information requested for a flight crew member, whether flight documentation and/or briefing or consultation; and

h) time(s) at which briefing, consultation and/or flight documentation are required.

CHAPTER 3. GLOBAL SYSTEMS, SUPPORTING CENTRES AND METEOROLOGICAL OFFICES

3.1 World area forecast centres within the framework of the world area forecast system

3.1.1 The Aeronautical Meteorological Service Provider (AMSP), having accepted responsibility for providing a world area forecast centre (WAFC) within the framework of the WAFS, shall arrange for that centre:

a) to prepare gridded global forecasts of:

   1) upper wind;

   2) upper-air temperature and humidity;

   3) geopotential altitude of flight levels;

   4) flight level and temperature of tropopause;

   5) direction, speed and flight level of maximum wind;

   6) cumulonimbus clouds;

   7) icing; and

   8) turbulence;

b) to prepare global forecasts of significant weather (SIGWX) phenomena;

c) to issue the forecasts referred to in a) and b) in digital form ;

d) to receive information concerning the release of radioactive materials into the atmosphere from its associated World Meteorological Organization (WMO) regional specialized meteorological centre (RSMC) for the provision of transport model products for radiological environmental emergency response, in order to include the information in SIGWX forecasts; and

e) to receive information on volcanic activity from volcanic ash advisory centres (VAACs) for the inclusion of such information in SIGWX forecasts.

3.1.2 In case of interruption of the operation of a WAFC, its functions shall be carried out by the other WAFC.

3.2 Aerodrome meteorological offices

3.2.1 The Aeronautical Meteorological Service Provider (AMSP) shall establish one or more aerodrome and/or other meteorological offices which shall be adequate for the provision of the meteorological service required to satisfy the needs of international air navigation.

3.2.2 An aerodrome meteorological office shall carry out all or some of the following functions as necessary to meet the needs of flight operations at the aerodrome:

a) prepare and/or obtain forecasts and other relevant information for flights with which it is concerned; the extent of its responsibilities to prepare forecasts shall be related to the local availability and use of en-route and aerodrome forecast material received from other offices;

b) prepare and/or obtain forecasts of local meteorological conditions;

c) maintain a continuous survey of meteorological conditions over the aerodromes for which it is designated to prepare forecasts;

d) provide briefing, consultation and flight documentation to flight crew members and/or other flight operations personnel;

e) supply other meteorological information to aeronautical users;

f) display the available meteorological information;

g) exchange meteorological information with other aerodrome meteorological offices; and

h) supply information received on pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud, to its associated air traffic services unit, aeronautical information service unit and meteorological watch office (MWO) as agreed between the Aeronautical Meteorological Service Provider (AMSP), Aeronautical Information Service Provider (AISP) and the Air Traffic Services Provider (ATSP) .

3.2.3 The aerodromes for which landing forecasts are required shall be determined by regional air navigation agreement.

3.2.4 For an aerodrome without an aerodrome meteorological office located at the aerodrome:

a) the Aeronautical Meteorological Service Provider (AMSP) shall designate one or more aerodrome meteorological office(s) to supply meteorological information as required; and

b) the Aeronautical Meteorological Service Provider (AMSP) shall establish means by which such information can be supplied to the aerodromes concerned.

3.3 Meteorological watch offices

3.3.1 The Aeronautical Meteorological Service Provider (AMSP) shall establish, in accordance with regional air navigation agreement, one or more MWOs, or arrange for another Contracting State to do so.

Note.— Guidance on the bilateral or multilateral arrangements between ICAO Contracting States for the provision of MWO services, including for cooperation and delegation, can be found in the Manual of Aeronautical Meteorological Practice *(Doc 8896).*

3.3.2 An MWO shall:

a) maintain continuous watch over meteorological conditions affecting flight operations within its area of responsibility;

b) prepare SIGMET and other information relating to its area of responsibility;

c) supply SIGMET information and, as required, other meteorological information to associated air traffic services units;

d) disseminate SIGMET information;

e) when required by regional air navigation agreement, in accordance with 7.2.1:

1) prepare AIRMET information related to its area of responsibility;

2) supply AIRMET information to associated air traffic services units; and

3) disseminate AIRMET information;

f) supply information received on pre-eruption volcanic activity, a volcanic eruption and volcanic ash cloud for which a SIGMET has not already been issued, to its associated area control centre (ACC)/flight information centre (FIC), as agreed between the Aeronautical Meteorological Service Provider (AMSP) and ATSP concerned, and to its associated VAAC as determined by regional air navigation agreement; and

g) supply information received concerning the release of radioactive materials into the atmosphere, in the area for which it maintains watch or adjacent areas, to its associated ACC/FIC, as agreed between the AMSP and ATSP, and AMSP and AISP concerned. The information shall comprise location, date and time of the release, and forecast trajectories of the radioactive materials.

Note.— The information is provided by RSMCs for the provision of transport model products for radiological environmental emergency response, at the request of the delegated authority of the State in which the radioactive material was released into the atmosphere, or the International Atomic Energy Agency (IAEA). The information is sent by the RSMC to a single contact point of the national meteorological service in each State. This contact point has the responsibility of redistributing the RSMC products within the State concerned. Furthermore, the information is provided by IAEA to RSMC co-located with VAAC London (designated as the focal point) which in turn notifies the ACCs/FICs concerned about the release.

3.3.3 **Recommendation.**— *The boundaries of the area over which meteorological watch is to be maintained by an MWO should be coincident with the boundaries of an FIR or a CTA or a combination of FIRs and/or CTAs.*

3.3.4 **Recommendation**.— *An MWO should coordinate the content of SIGMET and the provision of harmonized SIGMET information with neighbouring MWO(s), especially when the en- route weather phenomenon extends or is expected to extend beyond the MWO's specified area of responsibility.*

Note.— Guidance on the bilateral or multilateral coordination between MWOs of Contracting States for the provision of SIGMET can be found in the Manual of Aeronautical Meteorological Practice *(Doc 8896).*

3.4 Volcanic ash advisory centres

3.4.1 The Aeronautical Meteorological Service Provider (AMSP), having accepted the responsibility for providing a VAAC within the framework of the international airways volcano watch, shall arrange for that centre to respond to a notification that a volcano has erupted or is expected to erupt, or that volcanic ash is reported in its area of responsibility, by:

a) monitoring relevant geostationary and polar-orbiting satellite data and, where available, relevant ground-based and airborne data, to detect the existence and extent of volcanic ash in the atmosphere in the area concerned;

Note.— Relevant ground-based and airborne data include data derived from Doppler weather radar, ceilometers, lidar and passive infrared sensors.

b) activating the volcanic ash numerical trajectory/dispersion model in order to forecast the movement of any ash "cloud" which has been detected or reported;

Note.— The numerical model may be its own or, by agreement, that of another VAAC.

c) issuing advisory information regarding the extent and forecast movement of the volcanic ash "cloud" to:

1) MWOs, ACCs and FICs serving FIRs in its area of responsibility which may be affected;

2) other VAACs whose areas of responsibility may be affected;

3) WAFCs, international OPMET databanks, international NOTAM offices, and centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services; and

4) operators requiring the advisory information through the AFTN address provided specifically for this purpose; and

Note.— The AFTN address to be used by the VAACs is given in the Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List *(Doc 9766) which is available on the ICAO website.*

d) issuing updated advisory information to the MWOs, ACCs, FICs and VAACs referred to in c), as necessary, but at least every six hours until such time as:

1) the volcanic ash "cloud" is no longer identifiable from satellite data and, where available, ground-based and airborne data;

2) no further reports of volcanic ash are received from the area; and

3) no further eruptions of the volcano are reported.

3.4.2 **Recommendation.**— *Until 25 November 2026, for significant volcanic ash "clouds", VAACs in a position to do so should issue forecasts of quantitative volcanic ash concentration information for a volcanic ash "cloud" to the Aeronautical Meteorological Service Provider (AMSP).*

3.4.2 ***Recommendation***.— *As of 26 November 2026, for significant volcanic ash "clouds", VAACs should issue forecasts of quantitative volcanic ash concentration information for a volcanic ash "cloud" to the Aeronautical Meteorological Service Provider (AMSP)..*

Note 1.— The VAACs in a position to provide quantitative volcanic ash concentration information are included in the Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List *(Doc 9766)*.

Note 2.— Significant volcanic ash "clouds" in this context means an ash "cloud" that poses a widespread impact to aircraft operations and air navigation. Guidance on the criteria is provided in the Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List *(Doc 9766)*.

3.4.3 VAACs shall maintain a 24-hour watch.

3.4.4 In case of interruption of the operation of a VAAC, its functions shall be carried out by another VAAC or another meteorological centre, as designated by the VAAC Provider State concerned.

Note.— Back-up procedures to be used in case of interruption of the operation of a VAAC are included in the Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List (Doc 9766).

3.5 State volcano observatories

3.5.1 The AMSP, in accordance with regional air navigation agreement, shall arrange with other neighbouring states with active or potentially active volcanoes that the State volcano observatories shall monitor these volcanoes.

Note.— The Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List *(Doc 9766) contains guidance material about active or potentially active volcanoes*

3.6 Tropical cyclone advisory centres

3.6.1 The Aeronautical Meteorological Service Provider (AMSP) having accepted the responsibility for providing a tropical cyclone advisory centre (TCAC) shall arrange for that centre to:

a) monitor the development of tropical cyclones in its area of responsibility, using geostationary and polar-orbiting satellite data, radar data and other meteorological information;

b) issue advisory information concerning the position of the cyclone centre, changes in its intensity at the time of observation, its direction and speed of movement, central pressure and maximum surface wind near the centre, to:

1) MWOs in its area of responsibility;

2) other TCACs whose areas of responsibility may be affected; and

3) WAFCs, international OPMET databanks, and centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services; and

c) issue updated advisory information for each tropical cyclone, as necessary, but at least every six hours.

3.7 Space weather centres

3.7.1 The Aeronautical Meteorological Service Provider (AMSP), having accepted the responsibility for providing a space weather centre (SWXC) within the framework of the space weather information service, shall arrange for that Centre to :

a) monitor relevant ground-based, airborne and space-based observations to detect, and predict when possible, the existence of space weather phenomena that have an impact in the following areas:

1) high frequency (HF) radio communications;

2) communications via satellite;

3) GNSS-based navigation and surveillance; and

4) radiation exposure at flight levels;

b) issue advisory information regarding the extent, severity and duration of the space weather phenomena that have an impact referred to in a);

c) supply the advisory information referred to in b) to:

1) area control centres, flight information centres and aerodrome meteorological offices;

2) other SWXCs; and

3) international OPMET databanks, and aeronautical fixed service Internet-based services.

d) issue updated advisory information on space weather phenomena, as necessary, but at least every six hours until such time as the space weather phenomena are no longer detected and/or are no longer expected to have an impact.

3.7.2 SWXC shall maintain a 24-hour watch.

3.7.3 In case of interruption of the operation of a SWXC, its functions shall be carried out by another SWXC or another centre, as designated by the SWXC Provider State concerned.

3.7.4 The Aeronautical Meteorological Service Provider (AMSP), having accepted the responsibility for providing a regional space weather centre (SWXC) within the framework of the space weather information service, shall arrange for that centre to support the global SWXCs in their responsibilities under 3.8.1, 3.8.2 and 3.8.3.

CHAPTER 4. AERODROME METEOROLOGICAL OBSERVATIONAL INFORMATION

Note.— The Standards and Recommended Practices in this chapter are to be used in conjunction with the Procedures for Air Navigation Services — Meteorology (PANS-MET, Doc 10157), Chapter 2.

4.1 Aeronautical meteorological stations and observations

4.1.1 The Aeronautical Meteorological Service Provider (AMSP) shall establish, at aerodromes in its territory, such aeronautical meteorological stations as it determines to be necessary. An aeronautical meteorological station may be a separate station or may be combined with a synoptic station.

Note.— Aeronautical meteorological stations may include sensors installed outside the aerodrome, where considered justified, by the meteorological authority to ensure the compliance of meteorological service for international air navigation with the provisions of this Annex.

4.1.2 **Recommendation.**— *The AMSP should establish, or arrange for the establishment of, aero- nautical meteorological stations on offshore structures or at other points of significance in support of helicopter operations to offshore structures, if required by regional air navigation agreement.*

4.1.3 Aeronautical meteorological stations shall make routine observations at fixed intervals. At aerodromes, the routine observations shall be supplemented by special observations whenever specified changes occur in respect of surface wind, visibility, runway visual range, present weather, clouds and/or air temperature.

4.1.4 The Aeronautical Meteorological Service Provider (AMSP) shall arrange for the aeronautical meteorological stations to be inspected at sufficiently frequent intervals to ensure that a high standard of observation is maintained, that instruments and all their indicators are functioning correctly, and that the exposure of the instruments has not changed significantly.

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

4.1.5 At aerodromes with runways intended for Category II and III instrument approach and landing operations, automated equipment for measuring or assessing, as appropriate, and for monitoring and remote indicating of surface wind, visibility, runway visual range, height of cloud base, air and dew-point temperatures and atmospheric pressure shall be installed to support approach and landing and take-off operations. These devices shall be integrated automatic systems for acquisition, processing, dissemination and display in real time of the meteorological parameters affecting landing and take- off operations. The design of integrated automatic systems shall observe Human Factors principles and include back-up procedures.

Note 1.— Categories of precision approach and landing operations are defined in Annex 6, Part I.

Note 2.— Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual *(Doc 9683).*

4.1.6 **Recommendation.**— *At aerodromes with runways intended for Category I instrument approach and landing operations, automated equipment for measuring or assessing, as appropriate, and for monitoring and remote indicating of surface wind, visibility, runway visual range, height of cloud base, air and dew-point temperatures and atmospheric pressure should be installed to support approach and landing and take-off operations. These devices should be integrated automatic*

systems for acquisition, processing, dissemination and display in real time of the meteorological parameters affecting landing and take-off operations. The design of integrated automatic systems should observe Human Factors principles and include back-up procedures.

4.1.7 **Recommendation.**— *Where an integrated semi-automatic system is used for the dissemination/display of meteorological information, it should be capable of accepting the manual insertion of data covering those meteorological elements which cannot be observed by automatic means.*

4.1.8 The observations shall form the basis for the preparation of reports to be disseminated at the aerodrome of origin and of reports to be disseminated beyond the aerodrome of origin.

4.1.9 **Recommendation**.— *The meteorological instruments used at an aerodrome should be situated in such a way as to supply data which are representative of the area for which the measurements are required.*

Note.— Specifications concerning the siting of equipment and installations on operational areas, aimed at reducing the risk of damage to aircraft to a minimum, are contained in Annex 14, Volume I, Chapter 9.

4.1.10 **Recommendation**.— *Meteorological instruments at aeronautical meteorological stations should be exposed, operated and maintained in accordance with the practices, procedures and specifications promulgated by the World Meteorological Organization (WMO).*

Note.— Practices, procedures and specifications of WMO are contained in the Guide to Instruments and Methods of Observation *(WMO-No. 8)*, *Volume I*— Measurement of Meteorological Variables, *Volume II*— Observing Systems; *and Volume III*— Quality Assurance and Management of Observing Systems.

4.1.11 **Recommendation**.— *The observers at an aerodrome should be located, in so far as is practicable, so as to supply data which are representative of the area for which the observations are required.*

4.1.12 **Recommendation**.— *Where automated equipment forms part of an integrated semi-automatic observing system, displays of data which are made available to the local air traffic services units should be a subset of and displayed in parallel to those available in the local meteorological service unit. In those displays, each meteorological element should be annotated to identify, as appropriate, the locations for which the element is representative.*

4.2 Agreement between meteorological service provider and air traffic services authority

4.2.1 An agreement between the aeronautical meteorological service provider (AMSP) and the appropriate ATS provider (ATSP) shall be established to cover, among other things:

a) the provision in air traffic services units of displays related to integrated automatic systems;

b) the calibration and maintenance of these displays/instruments;

c) the use to be made of these displays/instruments by air traffic services personnel;

d) as and where necessary, supplementary visual observations (for example, of meteorological phenomena of operational significance in the climb-out and approach areas) if and when made by air traffic services personnel to update or supplement the information supplied by the meteorological station;

e) meteorological information obtained from aircraft taking off or landing (for example, on wind shear); and

f) if available, meteorological information obtained from ground weather radar.

Note.— Guidance on the subject of coordination between ATS and aeronautical meteorological services is contained in the Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological

Services *(Doc 9377)*.

4.3 Routine observations and reports

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 2.1.1.

4.3.1 At aerodromes, routine observations shall be made throughout the 24 hours of each day, unless otherwise agreed between the Aeronautical Meteorological Service Provider (AMSP), the ATSP and the operator concerned. Such observations shall be made at intervals of one hour or, if so determined by regional air navigation agreement, at intervals of one half-hour. At other aeronautical meteorological stations, such observations shall be made as determined by the Aeronautical Meteorological Service Provider (AMSP)taking into account the requirements of air traffic services units and aircraft operations.

4.3.2 Reports of routine observations shall be issued as:

a) local routine reports, only for dissemination at the aerodrome of origin (intended for arriving and departing aircraft); and
Note.— Technical specifications of the issuance of local routine reports are contained in the PANS-MET (Doc 10157), Chapter 2, 2.1.1.1.

b) METAR for dissemination beyond the aerodrome of origin (mainly intended for flight planning, VOLMET broadcasts and D-VOLMET).

Note 1.— Technical specifications of the issuance and the dissemination of METAR are contained in the PANS-MET (Doc 10157), Chapter 2, 2.1.1.2 and 2.1.1.3.

Note 2.— Meteorological information used in ATIS (voice-ATIS and D-ATIS) is to be extracted from the local routine report, in accordance with Annex 11, 4.3.6.1 g).

4.3.3 At aerodromes that are not operational throughout 24 hours in accordance with 4.3.1, METAR shall be issued prior to the aerodrome resuming operations in accordance with regional air navigation agreement.

4.4 Special observations and reports

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Sections 2.1.1 and 2.1.2.

4.4.1 A list of criteria for special observations shall be established by the Aeronautical Meteorological Service Provider (AMSP), in consultation with the ATSP, operators and others concerned.

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

Note.— Technical specifications of the issuance of local special reports are contained in the PANS-MET (Doc 10157) Chapter 2, 2.1.1.1.

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 1.— Technical specifications of the issuance and the dissemination of SPECI are contained in the PANS-MET (Doc 10157) Chapter 2, 2.1.1.2 and 2.1.1.3.

Note 2.— 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).

4.4.3 At aerodromes that are not operational throughout 24 hours in accordance with 4.3.1, following the resumption of the issuance of METAR, SPECI shall be issued, as necessary.

4.5 Characteristics of meteorological reports

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 2.1.1.

4.5.1 Local routine reports, local special reports, METAR and SPECI shall contain the following meteorological elements:

a) surface wind direction and speed;

b) visibility;

c) runway visual range, when applicable;

d) present weather;

e) cloud amount, cloud type (only for cumulonimbus and towering cumulus clouds) and height of cloud base or, where measured, vertical visibility;

f) air temperature and dew-point temperature; and

g) QNH and, when applicable, QFE (QFE included only in local routine and special reports).

4.5.2 **Recommendation.**— *In addition to elements listed under 4.5.1 a) to g), local routine reports, local special reports, METAR and SPECI should contain supplementary information.*

4.5.3 Optional elements included under supplementary information shall be included in METAR and SPECI in accordance with regional air navigation agreement.

4.6 Observing and reporting meteorological elements

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 2.2.

4.6.1 Surface wind

4.6.1.1 The mean direction and the mean speed of the surface wind shall be measured, as well as significant variations of the wind direction and speed, and reported in degrees true and metres per second (or knots), respectively.

4.6.1.2 **Recommendation.**— *When local routine and special reports are used for departing aircraft, the surface wind observations for these reports should be representative of conditions along the runway; when local routine and special reports are used for arriving aircraft, the surface wind observations for these reports should be representative of the touchdown zone.*

4.6.1.3 **Recommendation.**— *For METAR and SPECI, the surface wind observations should be representative of*

conditions above the whole runway where there is only one runway and the whole runway complex where there is more than one runway.

4.6.2 Visibility

4.6.2.1 The visibility as defined in Chapter 1 shall be measured or observed, and reported in metres or kilometres.

4.6.2.2 **Recommendation.**— *When local routine report and local special report are used for departing aircraft, the visibility observations for these reports should be representative of conditions along the runway; when local routine report and local special report are used for arriving aircraft, the visibility observations for these reports should be representative of the touchdown zone of the runway.*

4.6.2.3 **Recommendation.**— *For METAR and SPECI, the visibility observations should be representative of the aerodrome*.

4.6.3 Runway visual range

Note.— Guidance on the subject of runway visual range is contained in the Manual of Runway Visual Range Observing and Reporting Practices *(Doc 9328).*

4.6.3.1 Runway visual range as defined in Chapter 1 shall be assessed on all runways intended for Category II and III instrument approach and landing operations.

4.6.3.2 **Recommendation.**— *Runway visual range as defined in Chapter 1 should be assessed on all runways intended for use during periods of reduced visibility, including:*

a) precision approach runways intended for Category I instrument approach and landing operations; and

b) runways used for take-off and having high-intensity edge lights and/or centre line lights.

Note.— Precision approach runways are defined in Annex 14, Volume I, Chapter 1, under "Instrument runway".

4.6.3.3 The runway visual range, assessed in accordance with 4.6.3.1 and 4.6.3.2, shall be reported in metres throughout periods when either the visibility or the runway visual range is less than 1 500 m.

4.6.3.4 Runway visual range assessments shall be representative of:

a) the touchdown zone of the runway intended for non-precision or Category I instrument approach and landing operations;

b) the touchdown zone and the mid-point of the runway intended for Category II instrument approach and landing operations; and

c) the touchdown zone, the mid-point and stop-end of the runway intended for Category III instrument approach and landing operations.

4.6.3.5 The units providing air traffic service and aeronautical information service for an aerodrome shall be kept informed without delay of changes in the serviceability status of the automated equipment used for assessing runway visual range.

4.6.4 Present weather

4.6.4.1 The present weather occurring at the aerodrome shall be observed and reported as necessary. The following present weather phenomena shall be identified, as a minimum:

a) precipitation :rain, drizzle, snow and freezing precipitation (including intensity thereof);
b) obscurations: haze, mist, fog and freezing fog; and
c) thunderstorms (including thunderstorms in the vicinity).

4.6.4.2 **Recommendation.**— *For local routine report and local special report, the present weather information should be representative of conditions at the aerodrome.*

4.6.4.3 **Recommendation.**— *For METAR and SPECI, the present weather information should be representative of conditions at the aerodrome and, for certain specified present weather phenomena, in its vicinity.*

4.6.5 Clouds

4.6.5.1 Cloud amount, cloud type and height of cloud base shall be observed and reported as necessary to describe the clouds of operational significance. When the sky is obscured, vertical visibility shall be observed and reported, where measured, in lieu of cloud amount, cloud type and height of cloud base. The height of cloud base and vertical visibility shall be reported in metres (or feet).

4.6.5.2 **Recommendation.**— *Cloud observations for local routine and special reports should be representative of the runway threshold(s) in use.*

4.6.5.3 **Recommendation.**— *Cloud observations for METAR and SPECI should be representative of the aerodrome and its vicinity.*

4.6.6 Air temperature and dew-point temperature

4.6.6.1 The air temperature and the dew-point temperature shall be measured and reported in degrees Celsius.

4.6.6.2 **Recommendation.**— *Observations of air temperature and dew-point temperature for local routine reports, local special reports, METAR and SPECI should be representative of the whole runway complex.*

4.6.7 Atmospheric pressure

The atmospheric pressure shall be measured, and QNH and QFE values shall be computed and reported in hectopascals.

4.6.8 Supplementary information

Recommendation.— *Observations made at aerodromes should include the available supplementary information concerning significant meteorological conditions, particularly those in the approach and climb-out areas. Where practicable, the information should identify the location of the meteorological condition.*

4.7 Reporting meteorological information from automatic observing systems

4.7.1 **Recommendation.**— *METAR and SPECI from automatic observing systems should be used during non-operational hours of the aerodrome, and during operational hours of the aerodrome as determined by the Aeronautical Meteorological Service Provider (AMSP) in consultation with users based on the availability and efficient use of personnel.*

Note.— Guidance on the use of automatic meteorological observing systems is contained in Doc 9837.

4.7.2 **Recommendation.—** *Local routine report and local special report from automatic observing systems should be used during operational hours of the aerodrome as determined by Aeronautical Meteorological Service Provider (AMSP) in consultation with users based on the availability and efficient use of personnel.*

4.7.3 Local routine reports, local special reports, METAR and SPECI from automatic observing systems shall be identified with the word "AUTO".

4.8 Observing and reporting volcanic activity

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 2.3.

Recommendation.— *The occurrence of pre-eruption volcanic activity, volcanic eruptions and volcanic ash cloud should be reported without delay to the associated air traffic services unit, aeronautical information services unit and meteorological watch office. The report should be made in the form of a volcanic activity report.*

a) message type, VOLCANIC ACTIVITY REPORT;

b) station identifier, location indicator or name of station;

c) date/time of message;

d) location of volcano and name if known; and

e) concise description of event including, as appropriate, level of intensity of volcanic activity, occurrence of an eruption and its date and time, and the existence of a volcanic ash cloud in the area together with direction of ash cloud movement and height.

Note.— Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

4.9 Dissemination of meteorological reports

4.9.1 METAR and SPECI

4.9.1.1 METAR and SPECI shall be disseminated to international OPMET databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services, in accordance with regional air navigation agreement.

4.9.1.2 METAR and SPECI shall be disseminated to other aerodromes in accordance with regional air navigation agreement.

4.9.1.3 SPECI representing a deterioration in conditions shall be disseminated immediately after the observation. A SPECI representing a deterioration of one weather element and an improvement in another element shall be disseminated immediately after the observation.

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

4.9.2 Local routine report and local special report

4.9.2.1 Local routine reports shall be transmitted to local air traffic services units and shall be made available to the operators and to other users at the aerodrome.

4.9.2.2 Local special reports shall be transmitted to local air traffic services units as soon as the specified conditions occur. However, as agreed between the Aeronautical Meteorological Service Provider (AMSP) and the ATSP, they need not be issued in respect of:

a) any element for which there is in the local air traffic services unit a display corresponding to the one in the meteorological station, and where arrangements are in force for the use of this display to update information included in local routine report and local special report; and

b) runway visual range, when all changes of one or more steps on the reporting scale in use are being reported to the local air traffic services unit by an observer on the aerodrome.

Local special reports shall also be made available to the operators and to other users at the aerodrome.

CHAPTER 5. AIRCRAFT METEOROLOGICAL OBSERVATIONAL INFORMATION

Note.— The Standards and Recommended Practices in this chapter are to be used in conjunction with the Procedures for Air Navigation Services — Meteorology (PANS-MET, Doc 10157), Chapter 3.

5.1 Obligations of States

5.1.1 The Aeronautical Meteorological Service Provider (AMSP) shall arrange, , according to the provisions of this chapter, for observations to be made by aircraft operating on international and regional air routes and for the recording and reporting of these observations.

5.2 Types of aircraft observations

The following aircraft observations shall be made:

a) routine aircraft observations during en-route and climb-out phases of the flight; and

b) special and other non-routine aircraft observations during any phase of the flight.

5.3 Routine aircraft observations — designation

5.3.1 **Recommendation.**— *When air-ground data link is used and automatic dependent surveillance — contract (ADS-C) or secondary surveillance radar (SSR) Mode S is being applied, automated routine observations should be made every 15 minutes during the en-route phase and every 30 seconds during the climb-out phase for the first 10 minutes of the flight.*

5.3.2 **Recommendation.**— *For helicopter operations to and from aerodromes on offshore structures, routine observations should be made from helicopters at points and times as agreed between the meteorological service providers and the helicopter operators concerned.*

5.3.3 In the case of air routes with high-density air traffic (e.g. organized tracks), an aircraft from among the aircraft operating at each flight level shall be designated, at approximately hourly intervals, to make routine observations in accordance with 5.3.1. The designation procedures shall be in accordance with regional air navigation agreement.

5.3.4 In the case of the requirement to report during the climb-out phase, an aircraft shall be designated, at approximately hourly intervals, at each aerodrome to make routine observations in accordance with 5.3.1.

5.4 Routine aircraft observations — exemptions

Aircraft not equipped with air-ground data link shall be exempted from making routine aircraft observations.

5.5 Special aircraft observations

Special observations shall be made by all aircraft whenever the following conditions are encountered or observed:

a) moderate or severe turbulence; or

b) moderate or severe icing; or

c) severe mountain wave; or

d) thunderstorms, without hail, that are obscured, embedded, widespread or in squall lines; or

e) thunderstorms, with hail, that are obscured, embedded, widespread or in squall lines; or

f) heavy duststorm or heavy sandstorm; or

g) volcanic ash cloud; or

h) pre-eruption volcanic activity or a volcanic eruption; or

Note.— Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

i) runway braking action encountered is not as good as reported.

5.6 Other non-routine aircraft observations

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 3.2.

When other meteorological conditions not listed under 5.5, e.g. wind shear, are encountered and which, in the opinion of the pilot-in-command, may affect the safety or markedly affect the efficiency of other aircraft operations, the pilot-in-command shall advise the appropriate air traffic services unit as soon as practicable.

5.7 Reporting of aircraft observations

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 3.1.

5.7.1 Aircraft observations shall be reported by air-ground data link. Where air-ground data link is not available or appropriate, special and other non-routine aircraft observations during flight shall be reported by voice communications.

5.7.2 Aircraft observations shall be reported during flight at the time the observation is made or as soon thereafter as is practicable.

5.7.3 Routine and special aircraft observations shall be reported as routine and special air-reports, respectively. Routine and special air-reports reported by air-ground data link shall contain, as a minimum, the following meteorological information:

a) Wind direction;
b) wind speed;
c) air temperature; and
d) condition prompting the issuance of the air-report (only applicable for special air-reports).

5.8 Relay of air-reports by air traffic services units

5.8.1 The Aeronautical Meteorological Service Provider (AMSP)concerned shall make arrangements with the appropriate ATSP to ensure that, on receipt by the air traffic services units of:

a) special air-reports by voice communications, the air traffic services units relay them without delay to their associated meteorological watch office; and

b) routine and special air-reports by data link communications, the air traffic services units relay them without delay to their associated meteorological watch office, the WAFCs and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services.

5.8.2 **Recommendation.**— *The Aeronautical Meteorological Service Provider (AMSP) concerned should make arrangements with the appropriate ATS authority to ensure that:*

a) *special air-reports be uplinked for 60 minutes after their issuance; and*

b) *information on wind and temperature included in automated special air-reports not be uplinked to other aircraft in flight.*

5.9 Dissemination of air-reports

5.9.1 The meteorological watch office shall transmit without delay the special air-reports received by voice communications to the world area forecast centres (WAFCs) and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services.

5.9.2 The meteorological watch office shall transmit without delay special air-reports of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud received to the associated volcanic ash advisory centres.

5.9.3 When a special air-report is received at the meteorological watch office but the forecaster considers that the phenomenon causing the report is not expected to persist and, therefore, does not warrant issuance of a SIGMET, the special air-report shall be disseminated in the same way that SIGMET information is disseminated in accordance with 7.4.2.1, i.e. to meteorological watch offices, WAFCs, and other meteorological offices in accordance with regional air navigation agreement.

Note.— The template used for special air-reports which are uplinked to aircraft in flight is in the PANS-MET (Doc 10157), Appendix 3, Table A3-2.

5.9.4 Air-reports received at WAFCs shall be further disseminated as basic meteorological data.

Note.— The dissemination of basic meteorological data is normally carried out on the World Meteorological Organization (WMO) Global Telecommunication System.

5.9.5 **Recommendation.**— *Where supplementary dissemination of air-reports is required to satisfy special aeronautical or meteorological requirements, arrangements for such dissemination should be agreed between the meteorological authorities concerned.*

5.9.6 Air-reports shall be exchanged in the format in which they are received.

CHAPTER 6. AERODROME AND EN-ROUTE METEOROLOGICAL FORECAST INFORMATION

Note.— The Standards and Recommended Practices in this chapter are to be used in conjunction with the Procedures for Air Navigation Services — Meteorology (PANS-MET, Doc 10157), Chapters 4 and 5.

6.1 Use of forecasts

The issue of a new forecast by an aerodrome 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.

6.2 Aerodrome meteorological forecast information

6.2.1 Aerodrome Forecasts (TAF)

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 4.1.

6.2.1.0 An aerodrome forecast shall be prepared, in accordance with regional air navigation agreement, by the aerodrome meteorological office designated by the Aeronautical Meteorological Service Provider (AMSP) concerned.

Note.— The aerodromes for which aerodrome forecasts are to be prepared and the period of validity of these forecasts are listed in the relevant facilities and services implementation document (FASID) regional electronic air navigation plan (eANP), Volume II.

6.2.1.1 An aerodrome forecast shall be issued at a specified time not earlier than one hour prior to the beginning of its validity period and consist of a concise statement of the expected meteorological conditions at an aerodrome for a specified period.

6.2.1.2 Aerodrome forecasts and amendments thereto shall be issued as TAF, and include the following meteorological elements:

a) surface wind;

b) visibility;

c) weather;

d) cloud; and

e) expected significant changes to one or more of these elements during the period of validity.

Optional elements shall be included in TAF in accordance with regional air navigation agreement.

Note 1.— Technical specifications of the issuance of aerodrome forecast are contained in the PANS-MET (Doc 10157) Chapter 4, 4.1.1.1 and 4.1.1.2.

Note 2.— The visibility included in TAF refers to the forecast prevailing visibility.

6.2.1.3 Aerodrome meteorological offices preparing TAF shall keep the forecasts under continuous review and, when necessary, shall issue amendments promptly. The length of the forecast and the number of changes indicated in the forecast shall be kept to a minimum.

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

6.2.1.4 TAF that cannot be kept under continuous review shall be cancelled.

6.2.1.5 **Recommendation.***— The period of validity of a routine TAF should be not less than 6 hours and not more than 30 hours; the 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 those valid for 12 to 30 hours should be issued every 6 hours.*

6.2.1.6 When issuing TAF, aerodrome meteorological offices shall ensure that not more than one TAF is valid at an aerodrome at any given time.

6.2.1.7 TAF and amendments thereto shall be disseminated to international OPMET databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services, in accordance with regional air navigation agreement.

6.2.2 Landing forecasts (trend forecasts)

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 4.2.

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

6.2.2.1 Landing forecasts shall be prepared in the form of a trend forecast.

6.2.2.2 A trend forecast shall consist of a concise statement of the expected significant changes in the meteorological conditions at that aerodrome to be appended to a local routine report, local special report, METAR or SPECI. The period of validity of a trend forecast shall be 2 hours from the time of the report which forms part of the landing forecast.

Note.— Technical specifications of the issuance of trend forecast are contained in the PANS-MET (Doc 10157) Chapter 4, 4.2.1.1 and 4.2.1.2.

6.2.2.3 The units and scales used in the trend forecast shall be the same as those used in the report to which it is appended.

6.2.3 Forecasts for take-off

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 4.3.

6.2.3.0 A forecast for take-off shall be prepared by the aerodrome meteorological office as agreed between the Aeronautical Meteorological Service Provider (AMSP) and the operators concerned.

6.2.3.1 **Recommendation.***— A forecast for take-off should refer to a specified period of time and should contain information on expected conditions over the runway complex in regard to surface wind direction and speed and any variations thereof, temperature, pressure (QNH), and any other elements as agreed locally*.

6.2.3.2 **Recommendation.***— A forecast for take-off should be supplied to operators and flight crew members on request within the 3 hours before the expected time of departure*.

6.2.3.3 **Recommendation.***— Aerodrome meteorological offices preparing forecasts for take-off should keep the forecasts*

under continuous review and, when necessary, should issue amendments promptly.

6.3 Area forecasts for low-level flights

6.3.1 Forecasts by world area forecast centres

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 5.1.

Global upper-air gridded and significant weather forecasts shall be issued by world area forecast centres (WAFCs) in uniform formats and codes for the supply of such forecasts.

6.3.2 Area forecasts for low-level flights (GAMET, and area forecasts in chart form)

6.3.2.0 When the density of traffic operating below flight level 100 (or up to flight level 150 in mountainous areas, or higher, where necessary) warrants the routine issue and dissemination of area forecasts for such operations, the frequency of issue, the form and the fixed time or period of validity of those forecasts, the dissemination and the criteria for amendments thereto shall be established by the Aeronautical Meteorological Service Provider (AMSP) in consultation with the users.

6.3.2.1 When the density of traffic operating below flight level 100 warrants the issuance of AIRMET information in accordance with 7.2.1, area forecasts for such operations shall be prepared in a format as agreed between the aeronautical meteorological service provider in the States concerned. When abbreviated plain language is used, the forecast shall be prepared as a GAMET area forecast,; when chart form is used, the forecast shall be prepared as a combination of forecasts of upper wind and upper-air temperature, and of SIGWX phenomena. The area forecasts shall be issued to cover the layer between the ground and flight level 100 (or up to flight level 150 in mountainous areas, or higher, where necessary) and shall contain information on en-route weather phenomena hazardous to low-level flights, in support of the issuance of AIRMET information, and additional information required by low-level flights.

Note.— Template of GAMET is contained in the PANS-MET (Doc 10157), Appendix 6, Table A6-1.

6.3.2.2 Area forecasts for low-level flights prepared in support of the issuance of AIRMET information shall be issued every 6 hours for a period of validity of 6 hours and transmitted to meteorological watch offices and/or aerodrome meteorological offices concerned not later than one hour prior to the beginning of their validity period.

6.3.2.3 Area forecasts for low-level flights prepared in support of the issuance of AIRMET information shall be exchanged between aerodrome meteorological offices and/or meteorological watch offices responsible for the issuance of flight documentation for low-level flights in the flight information regions concerned.

6.3.2.4 **Recommendation.**— *Area forecasts for low-level flights prepared in support of the issuance of AIRMET information should be disseminated to the aeronautical fixed service Internet-based services.*

Note.— Area forecasts for low-level flights in 6.3.2.4 and 6.3.2.5 are prepared in accordance with regional air navigation agreement, similar to the corresponding AIRMET information.

6.3.3 Forecasts by volcanic ash advisory centres

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 5.3.

When issuing forecasts of quantitative volcanic ash concentration information for a volcanic ash “cloud” in accordance with 3.5.2, volcanic ash advisory centres shall adopt uniform formats and codes for their supply.

CHAPTER 7. METEOROLOGICAL INFORMATION CONTAINING ADVISORIES, ALERTS, WARNINGS AND NOTICES

Note.— The Standards and Recommended Practices in this chapter are to be used in conjunction with the Procedures for Air Navigation Services — Meteorology (PANS-MET, Doc 10157), Chapter 6.

7.1 Volcanic ash advisory information and information from State volcano observatories

Note. — Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 6.1.

7.1.1. The advisory information on volcanic ash shall be issued by a volcanic ash advisory centre.

7.1.2. *Recommendation.— Information on volcanic activity, and/or volcanic ash in the atmosphere should be issued by a State volcano observatory as a Volcano Observatory Notice for Aviation (VONA).*

7.2 Tropical cyclone advisory information

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 6.2.

The advisory information on tropical cyclones shall be issued by a tropical cyclone advisory centre.

7.3 Space weather advisory information

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 6.3.

The advisory information on space weather shall be issued by a global space weather centre (SWXC).

7.4 SIGMET information

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 6.4.

7.4.1. General Provisos

7.4.1.1 SIGMET information shall be issued by a meteorological watch office and shall give a concise description concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations, and of the development of those phenomena in time and space. One of the following phenomena shall be included in SIGMET information:

a) thunderstorm;
b) tropical cyclone;
c) turbulence;
d) icing;
e) mountain wave;
f) duststorm;
g) sandstorm;
h) volcanic ash; and
i) radioactive cloud.

7.4.1.2 SIGMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area.

7.4.1.3 The period of validity of SIGMET information shall be not more than 4 hours. In the special case of SIGMET information for volcanic ash cloud and tropical cyclones, the period of validity shall be extended up to 6 hours.

7.4.1.4 Recommendation**.** *— SIGMET information concerning volcanic ash cloud and tropical cyclones should be based on advisory information provided by VAACs and TCACs, respectively, designated by regional air navigation agreement.*

7.4.1.1 Close coordination shall be maintained between the meteorological watch office and the associated area control centre/flight information centre to ensure that information on volcanic ash included in SIGMET and NOTAM is consistent.

7.4.1.2 SIGMET information shall be issued not more than 4 hours before the commencement of the period of validity. In the special case of SIGMET information for volcanic ash cloud and tropical cyclones, this information shall be issued as soon as practicable but not more than 12 hours before the commencement of the period of validity. SIGMET information for volcanic ash and tropical cyclones shall be updated at least every 6 hours.

7.4.1.3 **Recommendation.**— *In cases where the airspace is divided into an FIR and an upper flight information region (UIR), the SIGMET should be identified by the location indicator of the air traffic services unit serving the FIR.*

Note.— SIGMET information applies to the whole airspace within the lateral limits of the FIR, i.e. to the FIR and to the UIR. The particular areas and/or flight levels affected by the meteorological phenomena prompting the issuance of the SIGMET are included in SIGMET information.

7.1.1. Dissemination of SIGMET information

7.1.1.1 SIGMET information shall be disseminated to meteorological watch offices, WAFCs and to other meteorological offices in accordance with regional air navigation agreement. SIGMET information for volcanic ash shall also be disseminated to volcanic ash advisory centres.

7.1.1.2 SIGMET information shall be disseminated to international OPMET databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services, in accordance with regional air navigation agreement.

7.5. AIRMET information

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 6.5.

7.5.1. **General provisions**

7.5.1.1 AIRMET information shall be issued by a meteorological watch office in accordance with regional air navigation agreement, taking into account the density of air traffic operating below flight level 100 (or below flight level 150 in mountainous areas, or higher, where necessary). AIRMET information shall give a concise description concerning the occurrence and/or expected occurrence of specified en-route weather phenomena, which have not been included in Section I of the area forecast for low-level flights issued in accordance with Chapter 6, 6.3.2 and which may affect the safety of low-level flights, and of the development of those phenomena in time and space. One of the following phenomena shall be included in AIRMET information:

1) Surface wind speed;
2) surface visibility;
3) thunderstorms;
4) mountain obscuration;
5) cloud;
6) icing;
7) turbulence; and
8) mountain wave.

7.5.1.2 *Note.— Technical specifications of the issuance of AIRMET are contained in the PANS-MET (Doc 10157) Chapter 6, 6.5.1.*AIRMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area.

7.5.1.3 The period of validity of an AIRMET information shall be not more than 4 hours.

7.5.2. Dissemination of AIRMET information

7.5.2.1 **Recommendation.**— *AIRMET information should be disseminated to meteorological watch offices in adjacent FIRs and to other meteorological watch offices or aerodrome meteorological offices, as agreed between the meteorological authorities concerned.*

7.5.2.2 **Recommendation.** — *AIRMET information should be transmitted to international operational meteorological databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services, in accordance with regional air navigation agreement.*

7.6. Aerodrome warnings

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 6.6.

7.6.1 **Aerodrome warnings**

7.4.1.1 Aerodrome warnings shall be issued by the aerodrome meteorological office . Aerodrome warnings shall give concise information of meteorological conditions which could adversely affect aircraft on the ground, including parked aircraft, and the aerodrome facilities and services.

Note.— Template of aerodrome warnings is contained in the PANS-MET (Doc 10157), Appendix 7, Table A7-6.

7.4.1.2 **Recommendation.**— *Aerodrome warnings should relate to the occurrence or expected occurrence of one or more of the following phenomena:*
— tropical cyclone (to be included if the 10-minute mean surface wind speed at the aerodrome is expected to be 17 m/s (34 kt) or more)
— thunderstorm
— hail
— snow (including the expected or observed snow accumulation)
— freezing precipitation
— frost
— hoar frost or rime
— sandstorm
— duststorm
— rising sand or dust
— strong surface wind and gusts
— squall
— volcanic ash (including volcanic ash deposition)
— tsunami
— toxic chemicals
— other phenomena as agreed locally.

Note.— Aerodrome warnings related to the occurrence or expected occurrence of tsunami are not required where a national public safety plan for tsunami is integrated with the "at risk" aerodrome concerned.

7.4.1.3 ***Recommendation.*** *— Aerodrome warnings should be cancelled when the conditions are no longer occurring and/or no longer expected to occur at the aerodrome.*

7.6.2 Dissemination of aerodrome warning

Aerodrome warnings shall be disseminated in accordance with local arrangements to those concerned.

7.5. Wind shear warnings and alerts

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 6.7.

7.5.1. **General provisions**

Note.— Wind shear alerts are expected to complement wind shear warnings and together are intended to enhance situational awareness of wind shear.

7.5.1.1 Wind shear warnings shall be issued by the aerodrome meteorological office for aerodromes where wind shear is considered a factor, in accordance with local arrangements with the appropriate air traffic services unit and the operators concerned. Wind shear warnings shall give concise information on the observed or expected existence of wind shear which could adversely affect aircraft on the approach path or take-off path or during circling approach between runway level and 500 m (1 600 ft) above that level and aircraft on the runway during the landing roll or take-off run. Where local topography has been shown to produce significant wind shears at heights in excess of 500 m (1 600 ft) above runway level, then 500 m (1 600 ft) shall not be considered restrictive.

Note.— Template of wind shear warnings is contained in the PANS-MET (Doc 10157), Appendix 7, Table A7-7.

7.5.1.2 **Recommendation.**— *Wind shear warnings for arriving aircraft and/or departing aircraft should be cancelled when aircraft reports indicate that wind shear no longer exists or, alternatively, after an agreed elapsed time. The criteria for the cancellation of a wind shear warning should be defined locally for each aerodrome, as agreed between the meteorological service provider, the appropriate ATS authority and the operators concerned.*

7.5.1.3 At aerodromes where wind shear is detected by automated, ground-based, wind shear remote-sensing or detection equipment, wind shear alerts generated by these systems shall be issued. Wind shear alerts shall give concise, up-to-date information related to the observed existence of wind shear which could adversely affect aircraft on the final approach path or initial take-off path and aircraft on the runway during the landing roll or take-off run.

7.5.2. **Dissemination of wind shear warnings and alerts**

7.5.2.1 The wind shear warnings shall be disseminated in accordance with local arrangements to those concerned.

7.5.2.2 The wind shear alerts shall be disseminated from automated, ground-based, wind shear remote-sensing or detection equipment in accordance with local arrangements to those concerned.

CHAPTER 8. AERONAUTICAL CLIMATOLOGICAL INFORMATION

Note. — The Standards and Recommended Practices in this chapter are to be used in conjunction with the Procedures for Air Navigation Services — Meteorology (PANS-MET, Doc 10157), Chapter 7.

8.1 General provisions

Note 1.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 7.1.

Note 2.— In cases where it is impracticable to meet the requirements for aeronautical climatological information on a national basis, the collection, processing and storage of observational data may be effected through computer facilities available for international use, and the responsibility for the preparation of the required aeronautical climatological information may be delegated as agreed between the meteorological authorities concerned.

8.1.1 Aeronautical climatological information required for the planning of flight operations shall be prepared in the form of aerodrome climatological tables and aerodrome climatological summaries. Such information shall be supplied to aeronautical users as agreed between the Aeronautical Meteorological Service Provider (AMSP) and the user concerned.

8.1.2 **Recommendation.**— *Aeronautical climatological information should normally be based on observations made over a period of at least five years and the period should be indicated in the information supplied.*

8.1.3 **Recommendation.**— *Climatological data related to sites for new aerodromes and to additional runways at existing aerodromes should be collected starting as early as possible before the commissioning of those aerodromes or runways.*

8.2 Aerodrome climatological tables

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 7.2.

Recommendation.— *The Aeronautical Meteorological Service Provider (AMSP) should make arrangements for collecting and retaining the necessary observational data and have the capability:*

a) to prepare aerodrome climatological tables for each regular and alternate international aerodrome within its territory; and

b) to make available such climatological tables to an aeronautical user within a time period as agreed between the meteorological service provider and the user concerned.

8.3 Aerodrome climatological summaries

Recommendation.— *Aerodrome climatological summaries should follow the procedures prescribed by the World Meteorological Organization (WMO). Where computer facilities are available to store, process and retrieve the information, the summaries should be published or otherwise made available to aeronautical users on request. Where such computer facilities are not available, the summaries should be prepared using the models specified by WMO and should be published and kept up to date as necessary.*

8.4 Copies of meteorological observational data

The Aeronautical Meteorological Service Provider (AMSP), on request and to the extent practicable, shall make available to any other designated aeronautical meteorological service provider, to operators and to others concerned with the application of meteorology to international air navigation, meteorological observational data required for research, investigation or operational analysis.

8.5 Exchange of aeronautical climatological information

Recommendation.— *Aeronautical climatological information should be exchanged on request between meteorological authorities. Operators and other aeronautical users desiring such information should contact the aeronautical meteorological service provider responsible for its preparation.*

CHAPTER 9. METEOROLOGICAL SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

Note.— The Standards and Recommended Practices in this chapter are to be used in conjunction with the Procedures for Air Navigation Services — Meteorology (PANS-MET, Doc 10157), Chapter 8.

9.1 General provisions

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 8.1.

9.1.1 Meteorological information shall be supplied to operators and flight crew members for:

a) pre-flight planning by operators;

b) in-flight replanning by operators using centralized operational control of flight operations;

c) use by flight crew members before departure; and

d) aircraft in flight.

9.1.2 The Aeronautical Meteorological Service Provider (AMSP), in consultation with the operator, shall determine:

a) The type and format of meteorological information to be supplied; and

b) Methods and means of supplying that information.

9.1.3 Meteorological information supplied to operators and flight crew members shall cover the flight in respect of time, altitude and geographical extent. Accordingly, the information shall relate to appropriate fixed times, or periods of time, and shall extend to the aerodrome of intended landing, also covering the meteorological conditions expected between the aerodrome of intended landing and alternate aerodromes designated by the operator.

9.1.4 Meteorological information supplied to operators and flight crew members shall be up to date and include:

a) aerodrome and en-route observational information; and

b) aerodrome and en-route forecast information.forecasts of:

Note. — The list of meteorological information to be supplied to operators and flight crew members is contained in the PANS-MET (Doc 10157), 8.1.1.2.

9.1.5 En-route forecasts information shall be generated from the digital forecasts provided by the WAFCs whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the Aeronautical Meteorological Service Provider (AMSP)and the operator concerned.

9.1.6 When forecasts are identified as being originated by the WAFCs, no modifications shall be made to their

meteorological content.

9.1.7 The forecasts of upper wind and upper-air temperature and of SIGWX phenomena above flight level 100 requested for pre-flight planning and in-flight replanning by the operator shall be supplied as soon as they become available, but not later than 3 hours before departure. Other meteorological information requested for pre-flight planning and in-flight replanning by the operator shall be supplied as soon as is practicable.

9.1.8 **Recommendation.**— *Meteorological information for pre-flight planning and in-flight replanning by operators of helicopters flying to offshore structures should include data covering the layers from sea level to flight level 100.*

9.1.9 The Aeronautical Meteorological Service Provider (AMSP) shall, when necessary, obtain required meteorological reports and/or forecasts from the aeronautical meteorological service providers of other States to provide service to operators and flight crew members.

9.1.10 Meteorological information shall be supplied to operators and flight crew members at the location to be determined by the Aeronautical Meteorological Service Provider (AMSP), after consultation with the operators concerned and at the time agreed between the aerodrome meteorological office and the operator concerned. The service for pre-flight planning shall be confined to flights originating within the territory of Fiji. At an aerodrome without an aerodrome meteorological office at the aerodrome, arrangements for the supply of meteorological information shall be as agreed between the Aeronautical Meteorological Service Provider (AMSP) and the operator concerned.

9.2 Briefing, consultation and display

Note.— The requirements for the use of automated pre-flight information systems in providing briefing, consultation and display are contained in 9.4.

9.2.1 Briefing and/or consultation shall be provided, on request, to flight crew members and/or other flight operations personnel. Its purpose shall be to supply the latest available information on existing and expected meteorological conditions along the route to be flown, at the aerodrome of intended landing, alternate aerodromes and other aerodromes as relevant, either to explain and amplify the information contained in the flight documentation, or as agreed between the Aeronautical Meteorological Service Provider (AMSP) and the operator concerned, in lieu of flight documentation.

9.2.2 Meteorological information used for briefing, consultation and display shall include any or all of the information listed in 9.1.4.

9.2.3 If the aerodrome meteorological office expresses an opinion on the development of the meteorological conditions at an aerodrome which differs appreciably from the aerodrome forecast included in the flight documentation, the attention of flight crew members shall be drawn to the divergence. The portion of the briefing dealing with the divergence shall be recorded at the time of briefing and this record shall be made available to the operator.

9.2.4 The required briefing, consultation, display and/or flight documentation shall normally be provided by the aerodrome meteorological office associated with the aerodrome of departure. At an aerodrome where these services are not available, arrangements to meet the requirements of flight crew members shall be as agreed between the Aeronautical Meteorological Service Provider (AMSP)and the operator concerned. In exceptional circumstances, such as an undue delay, the aerodrome meteorological office associated with the aerodrome shall provide or, if that is not practicable, arrange for the provision of a new briefing, consultation and/or flight documentation as necessary.

9.2.5 **Recommendation.**— *The flight crew member and/or other flight operations personnel for whom briefing, consultation and/or flight documentation has been requested should visit the aerodrome meteorological office at the time agreed between the aerodrome meteorological office and the operator concerned. Where local circumstances at an aerodrome*

make personal briefing or consultation impracticable, the aerodrome meteorological office should provide those services by telephone or other suitable telecommunications facilities.

9.2.6 Recommendation.— *The material displayed should be readily accessible to the flight crew members or other flight operations personnel concerned.*

9.3 Flight documentation

Note 1.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 8.2.

Note 2.— The requirements for the use of automated pre-flight information systems in providing flight documentation are contained in 9.4.

9.3.1 Flight documentation to be made available shall comprise information listed under 9.1.4.

9.3.2 Whenever it becomes apparent that the meteorological information to be included in the flight documentation will differ materially from that made available for pre-flight planning and in flight replanning, the operator shall be advised immediately and, if practicable, be supplied with the revised information as agreed between the operator and the aerodrome meteorological office concerned.

9.3.3 **Recommendation.**— *In cases where a need for amendment arises after the flight documentation has been supplied, and before take-off of the aircraft, the aerodrome meteorological office should, as agreed locally, issue the necessary amendment or updated information to the operator or to the local air traffic services unit, for transmission to the aircraft.*

9.3.4 **Recommendation.** — *The flight documentation related to concatenated route-specific upper wind and upper-air temperature forecasts should be provided as agreed between the Aeronautical Meteorological Service Provider (AMSP) and the operator concerned.*

Note.— Guidance on the design, formulation and use of concatenated charts is contained in the Manual of Aeronautical Meteorological Practice (Doc 8896).

9.3.5 Meteorological information received from other meteorological offices shall be included in flight documentation without modification.

9.3.6 **Recommendation.**— *Charts included in flight documentation should have a high standard of clarity and legibility.*

Note.— The details of the characteristics of charts to be included in flight documentation are contained the Procedures for Air Navigation Services – Meteorology *(PANS-MET, Doc 10157), Section 8.2.3.1.*

9.3.7 The Aeronautical Meteorological Service Provider (AMSP)shall retain information supplied to flight crew members, either as printed copies or in computer files, for a period of at least 30 days from the date of issue. This information shall be made available, on request, for inquiries or investigations and, for these purposes, shall be retained until the inquiry or investigation is completed.

9.4 Automated pre-flight information systems for briefing, consultation, flight planning and flight documentation

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 8.3.

9.4.1 Where the Aeronautical Meteorological Service Provider (AMSP) uses automated pre-flight information systems

to supply and display meteorological information to operators and flight crew members for self-briefing, flight planning and flight documentation purposes, the information supplied and displayed shall comply with the relevant provisions in 9.1 to 9.3 inclusive.

9.4.2 **Recommendation.**— *Automated pre-flight information systems providing for a harmonized, common point of access to meteorological information and aeronautical information services information by operators, flight crew members and other aeronautical personnel concerned should be as agreed between the Aeronautical Meteorological Service Provider (AMSP)and the aeronautical information service provider or agency to provide service has been delegated in accordance with Annex 15, 2.1.1 c).*

Note.— The meteorological and aeronautical information services information concerned is specified in 9.1 to 9.3 and in the PANS-MET (Doc 10157), Chapter 8, and in the Procedures for Air Navigation Services — Aeronautical Information Management *(PANS-AIM, Doc 10066), 5.5, respectively.*

9.4.3 Where automated pre-flight information systems are used to provide for a harmonized, common point of access to meteorological information and aeronautical information services information by operators, flight crew members and other aeronautical personnel concerned, Aeronautical Meteorological Service Provider (AMSP)concerned shall remain responsible for ensuring that the quality control and quality management of meteorological information are provided by means of such systems in accordance with Chapter 2, 2.2.2.

Note.— The responsibilities relating to aeronautical information services information and the quality assurance of the information are contained in Annex 15, Chapters 1, 2 and 3.

9.4.4 Automated pre-flight information systems providing self-briefing facilities shall provide for access by operators and flight crew members to consultation, as necessary, with an aerodrome meteorological office by telephone or other suitable telecommunications means.

9.5 Meteorological information for aircraft in flight

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 8.4.

9.5.1 Meteorological information for use by aircraft in flight shall be supplied by an aerodrome meteorological office or meteorological watch office to its associated air traffic services unit and through D-VOLMET or VOLMET broadcasts as determined by regional air navigation agreement. Meteorological information for planning by the operator for aircraft in flight shall be supplied on request, as agreed between Aeronautical Meteorological Service Provider (AMSP)and the operator concerned.

9.5.2 Meteorological information for use by aircraft in flight shall be supplied to air traffic services units in accordance with the specifications of Chapter 10.

9.5.3 **Recommendation.**— *If an aircraft in flight requests meteorological information, the aerodrome meteorological office or meteorological watch office which receives the request should arrange to supply the information with the assistance, if necessary, of another aerodrome meteorological office or meteorological watch office.*

9.5.4 Meteorological information shall be supplied through D-VOLMET or VOLMET broadcasts in accordance with the specifications of Chapter 11.

CHAPTER 10. METEOROLOGICAL INFORMATION FOR AIR TRAFFIC SERVICES, SEARCH AND RESCUE SERVICES AND AERONAUTICAL INFORMATION SERVICES

Note.— The Standards and Recommended Practices in this chapter are to be used in conjunction with the Procedures for Air Navigation Services — Meteorology (PANS-MET, Doc 10157), Chapter 9..

10.1 Information for air traffic services units

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 9.1.

10.1.1 General

10.1.1.1 The Aeronautical Meteorological Service Provider (AMSP) shall designate an aerodrome meteorological office or meteorological watch office to be associated with each air traffic services unit. The associated aerodrome meteorological office or meteorological watch office shall, after coordination with the air traffic services unit, supply, or arrange for the supply of, up-to-date meteorological information to the unit as necessary for the conduct of its functions.

10.1.1.2 **Recommendation.**— *An aerodrome meteorological office should be associated with an aerodrome control tower or approach control unit for the provision of meteorological information.*

10.1.1.3 A meteorological watch office shall be associated with a flight information centre or an area control centre for the provision of meteorological information.

10.1.1.4 **Recommendation.**— *Where, owing to local circumstances, it is convenient for the duties of an associated aerodrome meteorological office or meteorological watch office to be shared between two or more aerodrome meteorological offices or meteorological watch offices, the division of responsibility should be determined by the Aeronautical Meteorological Service Provider (AMSP) in consultation with the air traffic services provider.*

10.1.1.5 Any meteorological information requested by an air traffic services unit in connection with an aircraft emergency shall be supplied as rapidly as possible.

10.1.2 Supply, dissemination and transmission arrangements

10.1.2.1 Where necessary for flight information purposes, current meteorological reports and forecasts shall be supplied to designated aeronautical telecommunication stations. A copy of such information shall be forwarded, if required, to the FIC or ACC.

10.1.2.2 **Recommendation. —** *When computer-processed upper-air grid point data in digital form is made available to air traffic services units for use by air traffic services computers the transmission arrangements should be as agreed between the Aeronautical Meteorological Service Provider (AMSP)and the air traffic services provider. The data should be supplied as soon as is practicable after the processing of the forecasts has been completed.*

10.2 Information for search and rescue services units

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 9.2.

10.2.1 General

Aerodrome meteorological offices or meteorological watch offices designated by the Aeronautical Meteorological Service Provider (AMSP)in accordance with regional air navigation agreement shall supply search and rescue services units with the meteorological information they require in a form established by mutual agreement. For that purpose, the designated aerodrome meteorological office or meteorological watch office shall maintain liaison with the search and rescue services unit throughout a search and rescue operation.

10.2.2 List of information

Information to be supplied to rescue coordination centres shall include the meteorological conditions that existed in the last known position of a missing aircraft and along the intended route of that aircraft with particular reference to:

a) significant en-route weather phenomena;

b) cloud amount and type, particularly cumulonimbus; height indications of bases and tops;

c) visibility and phenomena reducing visibility;

d) surface wind and upper wind;

e) state of ground, in particular, any snow cover or flooding;

f) sea-surface temperature, state of the sea, ice cover if any and ocean currents, if relevant to the search area; and

g) sea-level pressure data.

10.3 Information for aeronautical information services units

10.3.1 General

The Aeronautical Meteorological Service Provider (AMSP), shall arrange for the supply of up- to-date meteorological information to relevant aeronautical information services units, as necessary, for the conduct of their functions.

10.3.2 List of information

The following information shall be supplied, as necessary, to an aeronautical information services unit:

a) information on meteorological service for international air navigation, intended for inclusion in the aeronautical information publication(s) concerned;

Note.— Details of this information are contained in the Procedures for Air Navigation Services — Aeronautical Information Management *(PANS-AIM, Doc 10066), Appendix 3, Part 1, GEN 3.5 and Part 3, AD 2.2, 2.11, 3.2 and 3.11.*

b) information necessary for the preparation of NOTAM or ASHTAM including, in particular, information on:

1) the establishment, withdrawal and significant changes in operation of aeronautical meteorological services. This information is required to be provided to the aeronautical information services unit sufficiently in advance of the effective date to permit issuance of NOTAM in compliance with Annex 15, 6.3.2.2 and 6.3.2.3;

2) the occurrence of volcanic activity; and

Note.— The specific information required is contained in Annex 3, Chapter 3, 3.3.2 h) and Chapter 4, 4.8.

3) release of radioactive materials into the atmosphere, as agreed between the meteorological and appropriate civil aviation authorities concerned; and

Note.— The specific information required is contained in Annex 3, Chapter 3, 3.4.2 g).

c) information necessary for the preparation of aeronautical information circulars including, in particular, information on:

1) expected important changes in aeronautical meteorological procedures, services and facilities provided; and

2) effect of certain weather phenomena on aircraft operations.

CHAPTER 11. USE OF COMMUNICATIONS TO EXCHANGE METEOROLOGICAL INFORMATION

Note 1.— The Standards and Recommended Practices in this chapter are to be used in conjunction with the Procedures for Air Navigation Services — Meteorology (PANS-MET, Doc 10157), Chapter 10.

Note 2.— It is recognized that it is for each Contracting State to decide upon its own internal organization and responsibility for implementing the telecommunications facilities referred to in this chapter.

11.1 Requirements for communications

11.1.1 Suitable telecommunications facilities shall be made available to permit aerodrome meteorological offices and, as necessary, aeronautical meteorological stations to supply the required meteorological information to air traffic services units on the aerodromes for which those offices and stations are responsible, and in particular to aerodrome control towers, approach control units and the aeronautical telecommunications stations serving these aerodromes.

11.1.2 Suitable telecommunications facilities shall be made available to permit meteorological watch offices to supply the required meteorological information to air traffic services and search and rescue services units in respect of the flight information regions, control areas and search and rescue regions for which those offices are responsible, and in particular to flight information centres, area control centres and rescue coordination centres and the associated aeronautical telecommunications stations.

11.1.3 Suitable telecommunications facilities shall be made available to permit world area forecast centres to supply the required world area forecast system forecasts to aerodrome meteorological offices, aeronautical meteorological service providers and other users.

11.1.4 Telecommunications facilities between aerodrome meteorological offices and, as necessary, aeronautical meteorological stations and aerodrome control towers or approach control units shall permit communications by direct speech, the speed with which the communications can be established being such that the required points may normally be contacted within approximately 15 seconds.

11.1.5 **Recommendation.**— *Telecommunications facilities between aerodrome meteorological offices or meteorological watch offices and flight information centres, area control centres, rescue coordination centres and aeronautical telecommunications stations should permit:*

a) communications by direct speech, the speed with which the communications can be established being such that the required points may normally be contacted within approximately 15 seconds; and

b) printed communications, when a record is required by the recipients; the message transit time should not exceed 5 minutes.

Note.— In 11.1.4 and 11.1.5, "approximately 15 seconds" refers to telephony communications involving switchboard operation and "5 minutes" refers to printed communications involving retransmission.

11.1.6 **Recommendation.**— *The telecommunications facilities required in accordance with 11.1.4 and 11.1.5 should be supplemented, as and where necessary, by other forms of visual or audio communications, for example, closed-circuit television or separate information processing systems.*

11.1.7 **Recommendation.**— *As agreed between the aeronautical meteorological service provider and the operators concerned, provision should be made to enable operators to establish suitable telecommunications facilities for obtaining meteorological information from aerodrome meteorological offices or other appropriate sources.*

11.1.8 Suitable telecommunications facilities shall be made available to permit meteorological offices to exchange operational meteorological information with other meteorological offices.

11.1.9 **Recommendation.**— *The telecommunications facilities used for the exchange of operational meteorological information should be the aeronautical fixed service or, for the exchange of non-time critical operational meteorological information, the public Internet, subject to availability, satisfactory operation and bilateral/multilateral and/or regional air navigation agreements.*

Note 1.— Aeronautical fixed service Internet-based services, operated by the world area forecast centres, providing for global coverage are used to support the global exchanges of operational meteorological information.

Note 2.— Guidance material on non-time-critical operational meteorological information and relevant aspects of the public Internet is provided in the Guidelines on the Use of the Public Internet for Aeronautical Applications *(Doc 9855)*.

11.1.10 ***Recommendation.***— *When upper-air grid point data in digital form is made available for use by air traffic services computers, the transmission arrangements should be as agreed between the Aeronautical Meteorological Service Provider (AMSP) and the appropriate ATS authority.*

11.1.11 ***Recommendation.***— *When upper-air grid point data in digital form is made available to operators for flight planning by computer, the transmission arrangements should be as agreed between the world area forecast centre concerned, the Aeronautical Meteorological Service Provider (AMSP)and the operators concerned.*

11.2 Use of aeronautical fixed service communications and the public Internet

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 10.1.

11.2.1 Meteorological bulletins

11.2.1.1. Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service or the public Internet shall be originated by the appropriate meteorological office or aeronautical meteorological station.

Note.— Meteorological bulletins containing operational meteorological information authorized for transmission via the aeronautical fixed service are listed in Annex 10, Volume II, Chapter 4, together with the relevant priorities and priority indicators.

11.2.1.2 Messages and bulletins containing operational meteorological information shall achieve transit times of less than 5 minutes, unless otherwise determined to be lower by regional air navigation agreement.

11.2.2 World area forecast system forecasts

11.2.2.1 Recommendation.— The telecommunications facilities used for the supply of WAFS forecasts should be the aeronautical fixed service or the public Internet.

11.2.2.2 Recommendation.— WAFS forecasts should be transmitted using digital data communications techniques. The method and channels used for the dissemination of the forecasts should be as determined by regional air navigation agreement.

11.3 Use of aeronautical mobile service communications

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 10.2.

The content and format of meteorological information transmitted to aircraft and by aircraft shall be consistent with the provisions of this Standards Document.

11.4 Use of aeronautical data link service —D-VOLMET

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 10.3.

D-VOLMET shall contain current METAR and SPECI, together with trend forecasts where available, TAF and SIGMET, special air-reports not covered by a SIGMET and, where available, AIRMET.

Note.— The requirement to provide METAR and SPECI may be met by the data link-flight information service (D-FIS) application entitled "Data link-aerodrome routine meteorological report (D-METAR) service"; the requirement to provide TAF may be met by the D-FIS application entitled "Data link-aerodrome forecast (D-TAF) service"; and the requirement to provide SIGMET and AIRMET messages may be met by the D-FIS application entitled "Data link-SIGMET (D-SIGMET) service". The details of these data link services are specified in the Manual of Air Traffic Services Data Link Applications *(Doc 9694)*.

11.5 Use of aeronautical broadcasting service —VOLMET broadcasts

Note.— Procedures and technical specifications related to this section are contained in the PANS-MET (Doc 10157), Section 10.4.

11.5.1 Continuous VOLMET broadcasts, normally on very high frequencies (VHF), shall contain current METAR and SPECI, together with trend forecasts where available.

11.5.2 Scheduled VOLMET broadcasts, normally on high frequencies (HF), shall contain current METAR and SPECI, together with trend forecasts where available and, where so determined by regional air navigation agreement, TAF and SIGMET.

ENDS