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LEGAL SUPPLEMENT — B

GUYANA No. 29 of 2024

GUYANA CIVIL AVIATION AUTHORITY

REQUIREMENTS FOR METEOROLOGICAL SERVICE FOR AIR NAVIGATION 2024

Made under

THE CIVIL AVIATION ACT 2018

(Act No. 21 of 2018)

In exercise of the powers conferred upon the Guyana Civil Aviation Authority by section 142 of the Civil Aviation Act 2018, the Guyana Civil Aviation Authority prescribes the following Requirements which may be cited as the Civil Aviation Requirements for Meteorological Service for Air Navigation 2024.

These Requirements are prescribed in respect of the Civil Aviation (Air Navigation Services) Regulations 2024 and contain:

(a) applicable standards;

(b) rules and recommended practices of international aviation organisations; and

(c) other requirements of the Authority.

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ABBREVIATIONS AND ACRONYMS

ACC	– area control centre
AFS	– aeronautical fixed service
AFTN	– aeronautical fixed telecommunication network
AIRMET	– information concerning en-route weather phenomena which may affect the safety of low-level aircraft operations
ATS	– air traffic services
FIC	– flight information centre
FIR	– flight information region
ICAO	– International Civil Aviation Organization
IWXXM	– ICAO meteorological information exchange model
MET	– meteorological service for air navigation
METAR	– aerodrome routine meteorological report
MWO	– meteorological watch office
NOTAM	– notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations
QFE	– atmospheric pressure at aerodrome elevation (or at runway threshold)
QNH	– altimeter sub-scale setting to obtain elevation when on the ground
RNAV	– area navigation
RVR	– runway visual range
SIGMET	– information concerning en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations
SPECI	– aerodrome special meteorological report
TAF	– aerodrome forecast
WMO	– World Meteorological Organization

DEFINITIONS

Note.— The designation (RR) in these definitions indicates a definition which has been extracted from the Radio Regulations of the International Telecommunication Union (ITU).

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 elevation. The elevation of the highest point of the landing area.

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 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.

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 entity, as designated by the Guyana Civil Aviation Authority, responsible for providing air traffic services in the airspace concerned (hereinafter referred to as the "ATS Provider").

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

Area navigation (RNAV). A method of navigation which permits aircraft operations on any desired flight path within the coverage of ground- or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

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.

Elevation. The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.

Extended range operation. Any flight by an aeroplane with two turbine engines where the flight time at the one engine inoperative cruise speed (in ISA and still air conditions), from a point on the route to an adequate alternate aerodrome, is greater than the threshold time approved by the State of the Operator.

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 and providing 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, as designated or approved by the Guyana Civil Aviation Authority, providing or arranging for the provision of meteorological service for air navigation (hereinafter referred to as the "MET Provider").

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. 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 radio aid to navigation.

Navigation specification. A set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace. There are two kinds of navigation specifications:

Required navigation performance (RNP) specification. A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH.

Area navigation (RNAV) specification. A navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.

Note.— The Performance-based Navigation (PBN) Manual *(Doc 9613), Volume II, contains detailed guidance on navigation specifications.*

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.

Operational planning. The planning of flight operations by an operator.

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

Performance-based navigation (PBN). Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.

Note.— Performance requirements are expressed in navigation specification (RNAV specification, RNP specification) in terms of accuracy, integrity, continuity, and functionality needed for the proposed operation in the context of a particular airspace concept. Availability of a global navigation satellite system signal in space (GNSS SIS) or some other NAVAID infrastructure is considered within the airspace concept in order to enable the navigation application.

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*).

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

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.

Reporting point. A specified geographical location in relation to which the position of an aircraft can be reported.

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 centre designated 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.

Note.— A space weather centre is designated as global and/or regional.

Standard isobaric surface. An isobaric surface used on a worldwide basis for representing and analysing the conditions in the atmosphere.

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 to its associated area control centre/flight information centre, meteorological watch office and volcanic ash advisory centre.

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.

Upper-air chart. A meteorological chart relating to a specified upper-air surface or layer of the atmosphere.

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.

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* ISO Standard 9000 — Quality Management Systems — Fundamentals and Vocabulary.

CHAPTER 1 – GENERAL SPECIFICATIONS

1.1 OBJECTIVE, DETERMINATION AND PROVISION OF METEOROLOGICAL SERVICE

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

1.1.2 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 air navigation, with the meteorological information necessary for the performance of their respective functions.

1.1.3 The Authority, in conjunction with the MET Provider, shall determine the meteorological service to be provided in the Georgetown FIR. Details of the MET Provider shall be published in the Guyana AIP.

1.1.4 The MET Provider 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 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.

1.2 SUPPLY, USE, QUALITY MANAGEMENT AND INTERPRETATION OF METEOROLOGICAL INFORMATION

1.2.1 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 air navigation.

1.2.2 The MET Provider 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 1.1.2.

1.2.3 The quality system established in accordance with 1.2.2 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).*

1.2.4 The quality system shall 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 shall not be supplied to the users unless it is validated with the originator.

1.2.5 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.

1.2.6 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.

1.2.7 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.

1.2.8 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.

1.2.9 The meteorological information supplied to the users listed in 1.1.2 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.

1.3 NOTIFICATIONS REQUIRED FROM OPERATORS

1.3.1 An operator requiring meteorological service or changes in existing meteorological service shall notify, sufficiently in advance, the MET Provider or the aerodrome meteorological office concerned. The minimum amount of advance notice required shall be as agreed between the MET Provider or aerodrome meteorological office and the operator concerned.

1.3.2 The MET Provider 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 MET Provider.

1.3.3 The operator or a flight crew member shall ensure that, where required by the MET Provider in consultation with users, 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.

1.3.4 The notification to the aerodrome meteorological office of individual flights shall 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 2 – GLOBAL SYSTEMS, SUPPORTING CENTRES AND METEOROLOGICAL OFFICES

2.1 WORLD AREA FORECAST SYSTEM

The objective of the world area forecast system (WAFS) shall be to supply meteorological authorities and other users with global aeronautical meteorological en-route forecasts in digital form. This objective shall be achieved through a comprehensive, integrated, worldwide and, as far as practicable, uniform system, and in a cost-effective manner, taking full advantage of evolving technologies.

2.2 WORLD AREA FORECAST CENTRES

2.2.1 ICAO Annex 3, Chapter 3 prescribes provisions for Contracting States which have accepted the responsibility for providing a WAFC within the framework of the world area forecast system.

2.2.2 Guyana is not a WAFC. However, the MET Provider shall be familiar with the roles, functions, products/services of WAFCs in order to be able to interact with them effectively.

2.3 AERODROME METEOROLOGICAL OFFICES

2.3.1 The MET Provider shall arrange for the establishment of one or more aerodrome and/or other meteorological offices at those aerodromes where the Authority has deemed such establishment necessary, which shall be adequate for the provision of the meteorological service required to satisfy the needs of air navigation.

2.3.2 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 meteorological, aeronautical information service and ATS authorities concerned.

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

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

a) the MET Provider concerned shall designate one or more aerodrome meteorological office(s) to supply meteorological information as required; and

b) the competent authorities shall establish means by which such information can be supplied to the aerodromes concerned.

2.4 METEOROLOGICAL WATCH OFFICES

2.4.1 The MET Provider shall arrange for the establishment of one or more MWOs to serve the Georgetown FIR, in accordance with regional air navigation agreement.

2.4.2 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 6.2.1:

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 meteorological and ATS authorities 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 meteorological and ATS authorities concerned, and to aeronautical information service units, as agreed between the meteorological and appropriate civil aviation authorities 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 WMO regional specialized meteorological centres (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.

2.4.3 The boundaries of the area over which meteorological watch is to be maintained by an MWO shall be coincident with the boundaries of the Georgetown FIR.

2.4.4 An MWO shall coordinate SIGMET with neighbouring MWO(s), especially when the enroute weather phenomenon extends or is expected to extend beyond the MWO's specified area of responsibility, in order to ensure the provision of harmonized SIGMET.

2.5 VOLCANIC ASH ADVISORY CENTRES

2.5.1 ICAO Annex 3, Chapter 3 prescribes provisions for Contracting States which have accepted the responsibility for providing a VAAC within the framework of international airways volcano watch.

2.5.2 Guyana is not a VAAC. However, the MET Provider shall be familiar with the roles, functions, products/services of VAACs in order to be able to interact with them effectively.

2.6 STATE VOLCANO OBSERVATORIES

2.6.1 ICAO Annex 3, Chapter 3 prescribes provisions for Contracting States with active or potentially active volcanoes that have established State volcano observatories.

2.6.2 Guyana has no active or potentially active volcanoes. However, the MET Provider shall:

a) coordinate with the Guyana Geology and Mines Commission regarding information received by the latter that can affect the region as it relates to:

i. significant pre-eruption volcanic activity, or a cessation thereof;

ii. a volcanic eruption, or a cessation thereof; and/or

iii. volcanic ash in the atmosphere;

b) familiar with the roles/functions of volcano observatories in the region so as to be able to interact with them and use their products/services effectively.

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

2.6.3 The MET Provider, upon receipt of any of the items listed under 2.6.2 a), shall send this information as quickly as practicable to the Georgetown ACC or FIC.

2.7 TROPICAL CYCLONE ADVISORY CENTRES

2.7.1 ICAO Annex 3, Chapter 3 prescribes provisions for Contracting States which have accepted the responsibility for providing a TCAC.

2.7.2 Guyana is not a TCAC. However, the MET Provider shall be familiar with the roles, functions, products/services of TCACs in order to be able to interact with them effectively.

2.8 SPACE WEATHER CENTRES

2.8.1 ICAO Annex 3, Chapter 3 prescribes provisions for Contracting States which have accepted the responsibility for providing a SWXC.

2.8.2 Guyana is not a SWXC. However, the MET Provider shall be familiar with the roles, functions, products/services of SWXCs in order to be able to interact with them effectively.

CHAPTER 3 – METEOROLOGICAL OBSERVATIONS AND REPORTS

3.1 AERONAUTICAL METEOROLOGICAL STATIONS AND OBSERVATIONS

3.1.1 The MET Provider shall establish aeronautical meteorological stations at aerodromes within the Georgetown FIR where the Authority has deemed such establishment 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 MET Provider to ensure the compliance of meteorological service for air navigation with the provisions of these Requirements.

3.1.2 The MET Provider shall establish, or arrange for the establishment of, aeronautical 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.

3.1.3 The MET Provider shall arrange for aeronautical meteorological stations to 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.

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

3.1.5 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 takeoff operations. The design of integrated automatic systems shall observe Human Factors principles and include back-up procedures.

3.1.6 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 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.

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

3.1.8 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.

3.2 AGREEMENT BETWEEN THE MET PROVIDER AND THE ATS PROVIDER

An agreement between the MET Provider and the ATS Provide 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.

3.3 ROUTINE OBSERVATIONS AND REPORTS

3.3.1 At aerodromes, routine observations shall be made throughout the 24 hours of each day, unless otherwise agreed between the MET Provider, the ATS Provider 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 MET Provider taking into account the requirements of air traffic services units and aircraft operations.

3.3.2 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
b) METAR for dissemination beyond the aerodrome of origin (mainly intended for flight planning, VOLMET broadcasts and D-VOLMET).

3.3.3 At aerodromes that are not operational throughout 24 hours in accordance with 3.3.1, METAR shall be issued prior to the aerodrome resuming operations in accordance with regional air navigation agreement.

3.4 SPECIAL OBSERVATIONS AND REPORTS

3.4.1 A list of criteria for special observations shall be established by the MET Provider, in consultation with the ATS Provider, operators and others concerned.

3.4.2 Reports of special observations shall be issued as:

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

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

3.4.3 At aerodromes that are not operational throughout 24 hours in accordance with 3.3.1, following the resumption of the issuance of METAR, SPECI shall be issued, as necessary.

3.5 CONTENTS OF REPORTS

3.5.1 Local routine reports, local special reports, METAR and SPECI shall contain the following elements in the order indicated:

a) identification of the type of report;

b) location indicator;

c) time of the observation;

d) identification of an automated or missing report, when applicable;

e) surface wind direction and speed;

f) visibility;

g) runway visual range, when applicable;

h) present weather;

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

j) air temperature and dew-point temperature; and

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

3.5.2 In addition to elements listed under 4.5.1 a) to k), local routine reports, local special reports, METAR and SPECI shall contain supplementary information to be placed after element k).

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

3.6 OBSERVING AND REPORTING METEOROLOGICAL ELEMENTS

3.6.1 Surface wind

3.6.1.1 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.

3.6.1.2 When local routine and special reports are used for departing aircraft, the surface wind observations for these reports shall 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 shall be representative of the touchdown zone.

3.6.1.3 For METAR and SPECI, the surface wind observations shall 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.

3.6.2 Visibility

3.6.2.1 The visibility as defined in this document shall be measured or observed, and reported in metres or kilometres.

3.6.2.2 When local routine and special reports are used for departing aircraft, the visibility observations for these reports shall be representative of conditions along the runway; when local routine and special reports are used for arriving aircraft, the visibility observations for these reports shall be representative of the touchdown zone of the runway.

3.6.2.3 For METAR and SPECI, the visibility observations shall be representative of the aerodrome.

3.6.3 Runway visual range

3.6.3.1 Runway visual range as defined in this document shall be assessed on all runways intended for Category II and III instrument approach and landing operations.

3.6.3.2 Runway visual range as defined in this document shall 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.

3.6.3.3 The runway visual range, assessed in accordance with 3.6.3.1 and 3.6.3.2, shall be reported in metres throughout periods when either the visibility or the runway visual range is less than 1 500 m.

3.6.3.4 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.

3.6.3.5 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.

3.6.4 Present weather

3.6.4.1 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: rain, drizzle, snow and freezing precipitation (including intensity thereof), haze, mist, fog, freezing fog and thunderstorms (including thunderstorms in the vicinity).

3.6.4.2 For local routine and special reports, the present weather information shall be representative of conditions at the aerodrome.

3.6.4.3 For METAR and SPECI, the present weather information shall be representative of conditions at the aerodrome and, for certain specified present weather phenomena, in its vicinity.

3.6.5 Clouds

3.6.5.1 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).

3.6.5.2 Cloud observations for local routine and special reports shall be representative of the runway threshold(s) in use.

3.6.5.3 Cloud observations for METAR and SPECI shall be representative of the aerodrome and its vicinity.

3.6.6 Air temperature and dew-point temperature

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

3.6.6.2 Observations of air temperature and dew-point temperature for local routine reports, local special reports, METAR and SPECI shall be representative of the whole runway complex.

3.6.7 Atmospheric pressure

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

3.6.8 Supplementary information

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

3.7 REPORTING METEOROLOGICAL INFORMATION FROM AUTOMATIC OBSERVING SYSTEMS

3.7.1 METAR and SPECI from automatic observing systems shall be used, where practicable to do so, during non-operational hours of the aerodrome, and during operational hours of the aerodrome as determined by the MET Provider in consultation with users based on the availability and efficient use of personnel.

3.7.2 Local routine and special reports from automatic observing systems shall be used, when practicable to do so, during operational hours of the aerodrome as determined by the MET Provider in consultation with users based on the availability and efficient use of personnel.

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

3.8 OBSERVATIONS AND REPORTS OF VOLCANIC ACTIVITY

When information regarding the occurrence of pre-eruption volcanic activity, volcanic eruptions and volcanic ash cloud, with the potential to affect the Georgetown FIR, is received by the MET Provider, such information shall be reported without delay to the associated air traffic services unit, aeronautical information services unit and other meteorological watch offices concerned. The report shall be made in the form of a volcanic activity report comprising the following information in the order indicated:

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.

CHAPTER 4 – AIRCRAFT OBSERVATIONS AND REPORTS

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 4.

4.1 OBLIGATION OF STATES

The Authority shall arrange, according to the provisions of these Requirements and the Civil Aviation (Operations) Regulations 2024, for observations to be made by aircraft of its registry operating on international air routes and for the recording and reporting of these observations.

4.2 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.

4.3 ROUTINE AIRCRAFT OBSERVATIONS — DESIGNATION

4.3.1 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 shall 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.

4.3.2 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 MET Provider and the helicopter operators concerned.

4.3.3 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 4.3.1.

The designation procedures shall be in accordance with regional air navigation agreement.

4.3.4 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 4.3.1.

4.4 ROUTINE AIRCRAFT OBSERVATIONS — EXEMPTIONS

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

4.5 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.

4.6 OTHER NON-ROUTINE AIRCRAFT OBSERVATIONS

When other meteorological conditions not listed under 4.5, 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.

Note.— Icing, turbulence and, to a large extent, wind shear are elements which, for the time being, cannot be satisfactorily observed from the ground and for which in most cases aircraft observations represent the only available evidence.

4.7 REPORTING OF AIRCRAFT OBSERVATIONS DURING FLIGHT

4.7.1 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.

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

4.7.3 Aircraft observations shall be reported as air-reports.

4.8 RELAY OF AIR-REPORTS BY AIR TRAFFIC SERVICES UNITS

The MET Provider concerned shall make arrangements with the ATS Provider 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.

4.9 RECORDING AND POST-FLIGHT REPORTING OF AIRCRAFT OBSERVATIONS OF VOLCANIC ACTIVITY

Special aircraft observations of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud shall be recorded on the special air-report of volcanic activity form. A copy of the form shall be included with the flight documentation provided to flights operating on routes which, in the opinion of the meteorological authority concerned, could be affected by volcanic ash clouds.

CHAPTER 5 – FORECASTS

5.1 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.

5.2 AERODROME FORECASTS

5.2.1 An aerodrome forecast shall be prepared, in accordance with regional air navigation agreement, by the aerodrome meteorological office designated by the MET Provider.

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).

5.2.2 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.

5.2.3 Aerodrome forecasts and amendments thereto shall be issued as TAF and include the following information in the order indicated:

a) identification of the type of forecast;

b) location indicator;

c) time of issue of forecast;

d) identification of a missing forecast, when applicable;

e) date and period of validity of forecast;

f) identification of a cancelled forecast, when applicable;

g) surface wind;

h) visibility;

i) weather;

j) cloud; and

k) 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.— The visibility included in TAF refers to the forecast prevailing visibility.

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

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

5.2.6 The period of validity of a routine TAF shall be not less than 6 hours and not more than 30 hours; the period of validity shall be determined by regional air navigation agreement. Routine TAF valid for less than 12 hours shall be issued every 3 hours and those valid for 12 to 30 hours shall be issued every 6 hours.

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

5.3 LANDING FORECASTS

5.3.1 A landing forecast shall be prepared by the aerodrome meteorological office designated by the MET Provider 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.

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

5.3.3 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.

5.4 FORECASTS FOR TAKE-OFF

5.4.1 A forecast for take-off shall be prepared by the aerodrome meteorological office designated by the MET Provider as agreed between the MET Provider and the operators concerned.

5.4.2 A forecast for take-off shall refer to a specified period of time and shall 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.

5.4.3 A forecast for take-off shall be supplied to operators and flight crew members on request within the 3 hours before the expected time of departure.

5.4.4 Aerodrome meteorological offices preparing forecasts for take-off shall keep the forecasts under continuous review and, when necessary, shall issue amendments promptly.

5.5 AREA FORECASTS FOR LOW-LEVEL FLIGHTS

5.5.1 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 and the criteria for amendments thereto shall be determined by the MET Provider in consultation with the users.

5.5.2 When the density of traffic operating below flight level 100 warrants the issuance of AIRMET information in accordance with 6.2.1, area forecasts for such operations shall be prepared in a format as agreed between the MET Provider and the users concerned. When abbreviated plain language is used, the forecast shall be prepared as a GAMET area forecast, employing approved ICAO abbreviations and numerical values; 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.

5.5.3 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.

CHAPTER 6 – SIGMET AND AIRMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS AND ALERTS

6.1 SIGMET INFORMATION

6.1.1 SIGMET information shall be issued by a meteorological watch office and shall give a concise description in abbreviated plain language 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.

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

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

6.1.4 SIGMET messages concerning volcanic ash cloud and tropical cyclones shall be based on advisory information provided by VAACs and TCACs, respectively, designated by regional air navigation agreement.

6.1.5 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 messages is consistent.

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

6.2 AIRMET INFORMATION

6.2.1 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. AIRMET information shall give a concise description in abbreviated plain language 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 5.5 of these Requirements and which may affect the safety of low-level flights, and of the development of those phenomena in time and space.

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

6.2.3 The period of validity of an AIRMET message shall be not more than 4 hours.

6.3 AERODROME WARNINGS

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

6.3.2 Aerodrome warnings shall be cancelled when the conditions are no longer occurring and/or no longer expected to occur at the aerodrome.

6.4 WIND SHEAR WARNINGS AND ALERTS

Note.— Guidance on the subject is contained in the ICAO Manual on Low-level Wind Shear *(Doc 9817). Wind shear alerts are expected to complement wind shear warnings and together are intended to enhance situational awareness of wind shear.*

6.4.1 Wind shear warnings shall be prepared by the aerodrome meteorological office designated by the MET Provider concerned for aerodromes where wind shear is considered a factor, in accordance with local arrangements with the appropriate ATS 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.

6.4.2 Wind shear warnings for arriving aircraft and/or departing aircraft shall 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 shall be defined locally for each aerodrome, as agreed between the MET Provider, the ATS Provider and the operators concerned.

6.4.3 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 involving a headwind/tailwind change of 7.5 m/s (15 kt) or more 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.

6.4.4 Wind shear alerts shall be updated at least every minute. The wind shear alert shall be cancelled as soon as the headwind/tailwind change falls below 7.5 m/s (15 kt).

CHAPTER 7 – AERONAUTICAL CLIMATOLOGICAL INFORMATION

7.1 General provisions

Note.— 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.

7.1.1 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 MET Provider and the user concerned.

7.1.2 Aeronautical climatological information shall normally be based on observations made over a period of at least five years and the period shall be indicated in the information supplied.

7.1.3 Climatological data related to sites for new aerodromes and to additional runways at existing aerodromes shall be collected starting as early as possible before the commissioning of those aerodromes or runways.

7.2 Aerodrome climatological tables

7.2.1 The MET Provider shall 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 Guyana; and

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

7.3 Aerodrome climatological summaries

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

7.4 Copies of meteorological observational data

The MET Provider, on request and to the extent practicable, shall make available to any other meteorological authority, 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.

CHAPTER 8 – SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

8.1 GENERAL PROVISIONS

8.1.1 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.

8.1.2 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.

8.1.3 Meteorological information supplied to operators and flight crew members shall be up to date and include the following information, as agreed between the MET Provider and the operators concerned:

a) forecasts of:

1) upper wind and upper-air temperature;

2) upper-air humidity;

3) geopotential altitude of flight levels;

4) flight level and temperature of tropopause;

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

6) SIGWX phenomena; and

7) cumulonimbus clouds, icing and turbulence;

Note 1.— Forecasts of upper-air humidity and geopotential altitude of flight levels are used only in automatic flight planning and need not be displayed.

Note 2.— Forecasts of cumulonimbus clouds, icing and turbulence are intended to be processed and, if necessary, visualized according to the specific thresholds relevant to user operations.

b) METAR or SPECI (including trend forecasts as issued in accordance with regional air navigation agreement) for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;
c) TAF or amended TAF for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;
d) forecasts for take-off;
e) SIGMET information and appropriate special air-reports relevant to the whole route;

Note.— Appropriate special air-reports will be those not already used in the preparation of SIGMET.

f) volcanic ash and tropical cyclone advisory information relevant to the whole route;
g) as determined by regional air navigation agreement, GAMET area forecasts and/or area forecasts for low-level flights in chart form prepared in support of the issuance of AIRMET information, and AIRMET information for low-level flights relevant to the whole route;
h) aerodrome warnings for the local aerodrome;
i) meteorological satellite images;
j) ground-based weather radar information; and
k) space weather advisory information relevant to the whole route.

8.1.4 Forecasts listed under 8.1.3 a) 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 MET Provider and the operator concerned.

8.1.5 When forecasts are identified as being originated by the WAFCs, no modifications shall be made to their meteorological content.

8.1.6 Charts generated from the digital forecasts provided by the WAFCs shall be made available, as required by operators, for fixed areas of coverage as shown in Appendix 8, Figures A8-1, A8-2 and A8-3.

8.1.7 When forecasts of upper wind and upper-air temperature listed under 8.1.3 a) 1) are supplied in chart form, they shall be fixed time prognostic charts for flight levels as specified in Appendix 2, 1.2.2 a). When forecasts of SIGWX phenomena listed under 8.1.3 a) 6) are supplied in chart form, they shall be fixed time prognostic charts for an atmospheric layer limited by flight levels as specified in Appendix 2, 1.3.2 and Appendix 5, 4.3.2.

8.1.8 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.

8.1.9 When necessary, the MET Provider providing service for operators and flight crew members shall initiate coordinating action with the meteorological authorities of other States with a view to obtaining from them the reports and/or forecasts required.

8.1.10 Meteorological information shall be supplied to operators and flight crew members at the location to be determined by the MET Provider, 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 Guyana. At an aerodrome without an aerodrome meteorological office at the aerodrome, arrangements for the supply of meteorological information shall be as agreed between the MET Provider and the operator concerned.

8.2 BRIEFING, CONSULTATION AND DISPLAY

8.2.1 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 Met Provider and the operator concerned, in lieu of flight documentation.

8.2.2 Meteorological information used for briefing, consultation and display shall include any or all of the information listed in 8.1.3.

8.2.3 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.

8.2.4 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 MET Provider 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.

8.2.5 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.

8.3 FLIGHT DOCUMENTATION

8.3.1 Flight documentation to be made available shall comprise information listed under 8.1.3 a) 1) and 6), b), c), e), f) and, if appropriate, g) and k). However, flight documentation for flights of two hours' duration or less, after a short stop or turnaround, shall be limited to the information operationally needed, as agreed between the MET Provider and the operator concerned, but in all cases it shall at least comprise information on 8.1.3 b), c), e), f) and, if appropriate, g) and k).

8.3.2 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.

8.3.3 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 shall, as agreed locally, issue the necessary amendment or updated information to the operator or to the local ATS unit, for transmission to the aircraft.

8.3.4 The MET Provider 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.

8.4 AUTOMATED PRE-FLIGHT INFORMATION SYSTEMS FOR BRIEFING, CONSULTATION, FLIGHT PLANNING AND FLIGHT DOCUMENTATION

8.4.1 Where the MET Provider 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 8.1 to 8.3 inclusive.

8.4.1.1 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 shall be as agreed between the MET Provider and the Authority or the agency to which the authority to provide service has been delegated in accordance with the applicable parts of the Civil Aviation Requirements for AIS 2024.

8.4.2 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, the MET Provider shall remain responsible for the quality control and quality management of meteorological information provided by means of such systems in accordance with Chapter 1, 1.2.2.

8.5 INFORMATION FOR AIRCRAFT IN FLIGHT

8.5.1 Meteorological information for use by aircraft in flight shall be supplied by an aerodrome meteorological office or meteorological watch office to its associated ATS 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 the MET Provider or meteorological authorities and the operator concerned.

8.5.2 Meteorological information for use by aircraft in flight shall be supplied to ATS units in accordance with the specifications of Chapter 9.

8.5.3 Meteorological information shall be supplied through D-VOLMET or VOLMET broadcasts in accordance with the specifications of Chapter 10.

CHAPTER 9 – INFORMATION FOR AIR TRAFFIC SERVICES, SEARCH AND RESCUE AND AERONAUTICAL INFORMATION SERVICES

9.1 INFORMATION FOR AIR TRAFFIC SERVICES UNITS

9.1.1 The MET Provider shall designate an aerodrome meteorological office or meteorological watch office to be associated with each ATS unit. The associated aerodrome meteorological office or meteorological watch office shall, after coordination with the ATS unit, supply, or arrange for the supply of, up-to-date meteorological information to the unit as necessary for the conduct of its functions.

9.1.2 An aerodrome meteorological office shall be associated with an aerodrome control tower or approach control unit for the provision of meteorological information.

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

9.1.4 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 shall be determined by the MET Provider in consultation with the ATS Provider.

9.1.5 Any meteorological information requested by an ATS unit in connection with an aircraft emergency shall be supplied as rapidly as possible.

9.2 INFORMATION FOR SEARCH AND RESCUE SERVICES UNITS

Aerodrome meteorological offices or meteorological watch offices designated by the MET Provider in accordance with regional air navigation agreement shall supply SAR 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 SAR services unit throughout a SAR operation.

9.3 INFORMATION FOR AERONAUTICAL INFORMATION SERVICES UNITS

The MET Provider shall arrange for the supply of up-to-date meteorological information to the AIS Provider, as necessary for the conduct of their functions.

CHAPTER 10 – REQUIREMENTS FOR AND USE OF COMMUNICATIONS

10.1 REQUIREMENTS FOR COMMUNICATIONS

10.1.1 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 ATS 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.

10.1.2 Suitable telecommunications facilities shall be made available to permit meteorological watch offices to supply the required meteorological information to ATS and SAR services units in respect of the flight information regions, control areas and SAR 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.

10.1.3 Suitable telecommunications facilities shall be made available to permit world area forecast centres to supply the required world area forecast system products to aerodrome meteorological offices, meteorological authorities and other users.

10.1.4 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.

10.1.5 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 10.1.4 and 10.1.5, "approximately 15 seconds" refers to telephony communications involving switchboard operation and "5 minutes" refers to printed communications involving retransmission.

10.1.6 The telecommunications facilities required in accordance with 10.1.4 and 10.1.5 shall be supplemented, as and where necessary, by other forms of visual or audio communications, for example, closed-circuit television or separate information processing systems.

10.1.7 As agreed between the MET Provider and the operators concerned, provision shall be made to enable operators to establish suitable telecommunications facilities for obtaining meteorological information from aerodrome meteorological offices or other appropriate sources.

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

10.1.9 The telecommunications facilities used for the exchange of operational meteorological information shall 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.

10.2 USE OF AERONAUTICAL FIXED SERVICE COMMUNICATIONS AND THE PUBLIC INTERNET — METEOROLOGICAL BULLETINS

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.

10.3 USE OF AERONAUTICAL FIXED SERVICE COMMUNICATIONS — WORLD AREA FORECAST SYSTEM PRODUCTS

World area forecast system products in digital form shall be transmitted using binary data communications techniques. The method and channels used for the dissemination of the products shall be as determined by regional air navigation agreement.

10.4 USE OF AERONAUTICAL MOBILE SERVICE COMMUNICATIONS

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

10.5 USE OF AERONAUTICAL DATA LINK SERVICE — CONTENTS OF D-VOLMET

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".

10.6 USE OF AERONAUTICAL BROADCASTING SERVICE — CONTENTS OF VOLMET BROADCASTS

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

10.6.2 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.

APPENDIX 1A – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

(see Chapter 8 of these Requirements)

MODEL A	OPMET information
MODEL IS	Upper wind and upper-air temperature chart for standard isobaric surface Example 1. Arrows, feathers and pennants (Mercator projection) Example 2. Arrows, feathers and pennants (Polar stereographic projection)
MODEL SWH	Significant weather chart (high level) Example. Polar stereographic projection (showing the jet stream vertical extent)
MODEL SWM	Significant weather chart (medium level)
MODEL SWL	Significant weather chart (low level) Example 1 Example 2
MODEL TCG	Tropical cyclone advisory information in graphical format
MODEL VAG	Volcanic ash advisory information in graphical format Example 1. Mercator projection Example 2. Polar stereographic projection
MODEL STC	SIGMET for tropical cyclone in graphical format
MODEL SVA	SIGMET for volcanic ash in graphical format Example 1. Mercator projection Example 2. Polar stereographic projection

MODEL SGE	SIGMET for phenomena other than tropical cyclone and volcanic ash in graphical format
MODEL SN	Sheet of notations used in flight documentation

APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

OPMET INFORMATION **MODEL A**

ISSUED BY ..... **METEOROLOGICAL OFFICE (DATE, TIME UTC)** .....

INTENSITY

" – " (light); no indicator (moderate); " + " (heavy, or a tornado/waterspout in the case of funnel cloud(s)) are used to indicate the intensity of certain phenomena

DESCRIPTORS

MI – shallow	PR – partial	BL – blowing	TS – thunderstorm
BC – patches	DR – low drifting	SH – shower(s)	FZ – freezing (supercooled)

PRESENT WEATHER ABBREVIATIONS

DZ – drizzle	BR – mist	PO – dust/sand whirls (dust devils)
RA – rain	FG – fog	SQ – squall
SN – snow	FU – smoke	FC – funnel cloud(s) (tornado or waterspout)
SG – snow grains	VA – volcanic ash	
PL – ice pellets	DU – widespread dust	SS – sandstorm
GR – hail	SA – sand	DS – duststorm
GS – small hail and/or snow pellets	HZ – haze	

EXAMPLES

+SHRA – heavy shower of rain	TSSN – thunderstorm with moderate snow
FZDZ – moderate freezing drizzle	SNRA – moderate snow and rain
+TSSNGR – thunderstorm with heavy snow and hail	

SELECTED ICAO LOCATION INDICATORS

CYUL	Montreal Pierre Elliot Trudeau/Intl	HECA	Cairo/Intl	OBBI	Bahrain Intl
		HKJK	Nairobi/Jomo Kenyatta	RJTT	Tokyo Intl
EDDF	Frankfurt/Main	KJFK	New York/John F. Kennedy Intl	SBGL	Rio de Janeiro/Galeão Intl
EGLL	London/Heathrow	LFPG	Paris/Charles de Gaulle	YSSY	Sydney/Kingsford Smith Intl
GMMC	Casablanca/Anfa	NZAA	Auckland Intl	ZBAA	Beijing/Capital

METAR CYUL 240700Z 27018G30KT 5000 SN FEW020 BKN045 M02/M07 Q0995=

METAR EDDF 240950Z 05015KT 9999 FEW025 04/M05 Q1018 NOSIG=

METAR LFPG 241000Z 07010KT 5000 SCT010 BKN040 02/M01 Q1014 NOSIG=

SPECI GMMC 220530Z 24006KT 5000 -TSGR BKN016TCU FEW020CB SCT026 08/07 Q1013=

TAF AMD NZAA 240855Z 2409/2506 24010KT 9999 FEW030 BECMG 2411/2413 VRB02KT 2000 HZ FM 242200 24010KT CAVOK=

TAF ZBAA 240440Z 2406/2506 13004MPS 6000 NSC BECMG 2415/2416 2000 SN OVC040 TEMPO 2418/24211000 SN BECMG 2500/2501 32004MPS 3500 BR NSC BECMG 2503/2504 32010G20MPS CAVOK=

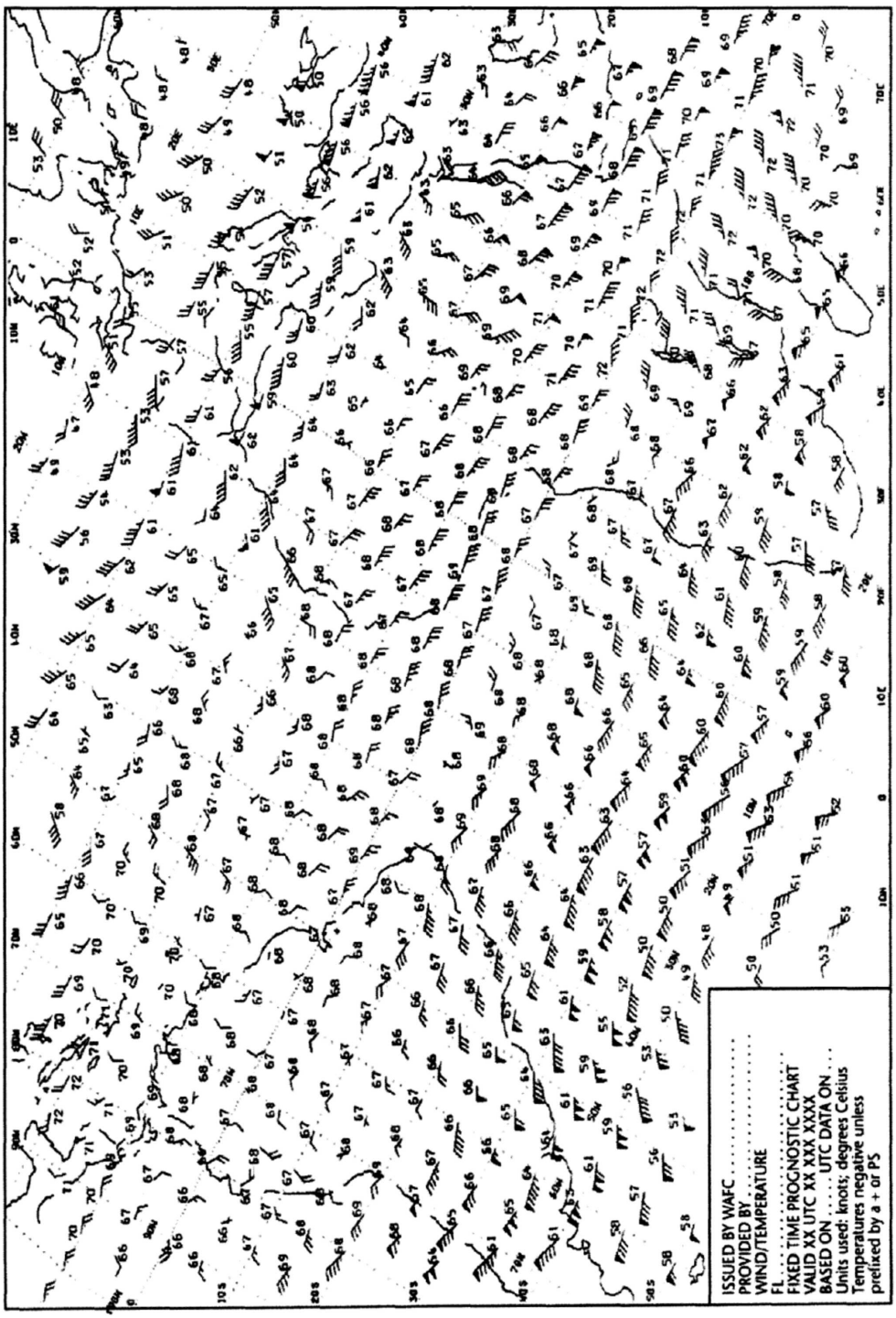
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HECC SIGMET 2 VALID 240900/241200 HECA-

HECC CAIRO FIR SEV TURB OBS N OF N27 FL 390/440 MOV E 25KMH NC.

APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

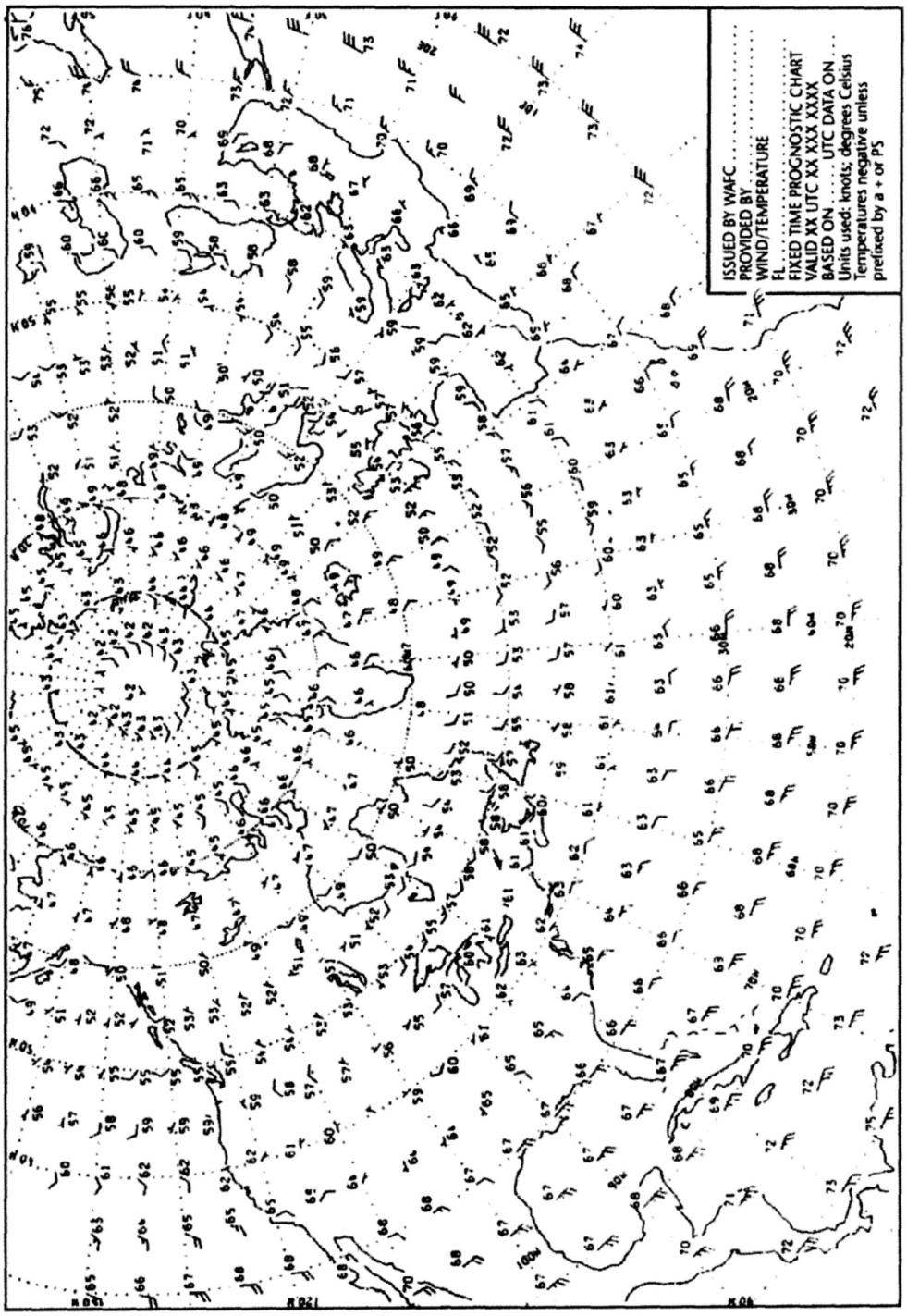
UPPER WIND AND UPPER-AIR TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE **MODEL IS**
Example 1. Arrows, feathers and pennants (Mercator projection)



APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

UPPER WIND AND UPPER-AIR TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE **MODEL IS**

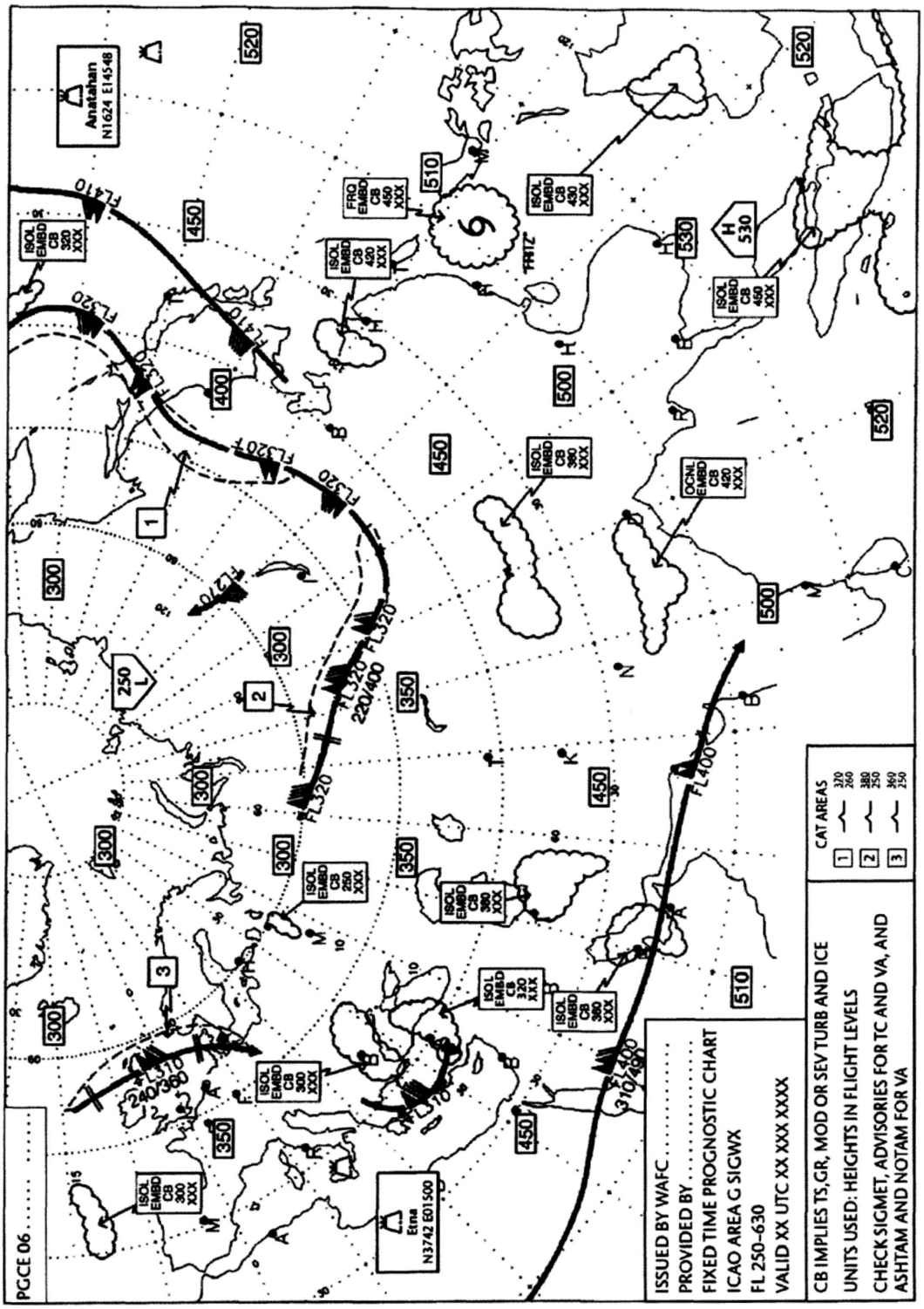
Example 2. Arrows, feathers and pennants (Polar stereographic projection)



APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

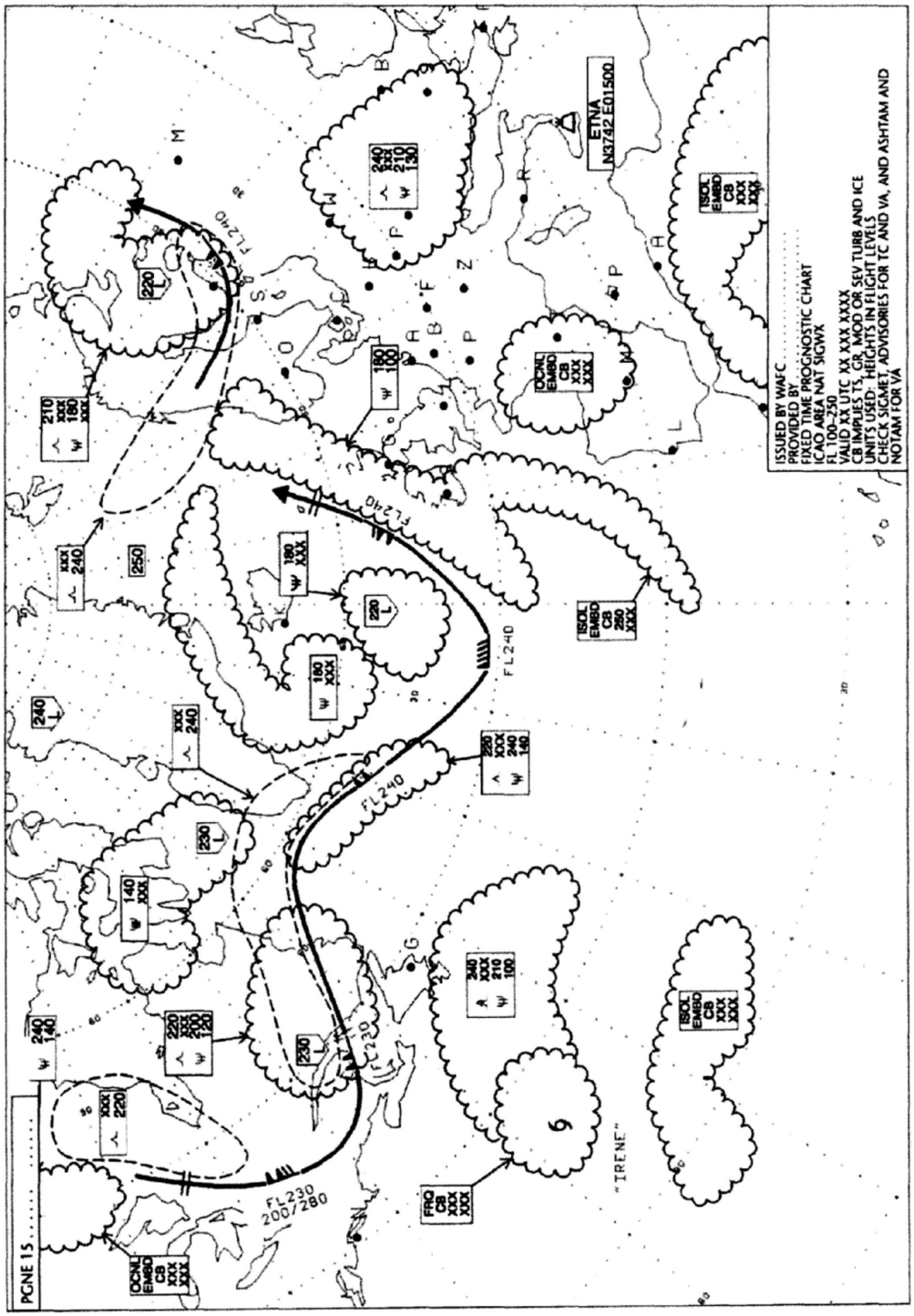
SIGNIFICANT WEATHER CHART (HIGH LEVEL) **MODEL SWH**

Example. Polar stereographic projection (showing the jet stream vertical extent)



APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

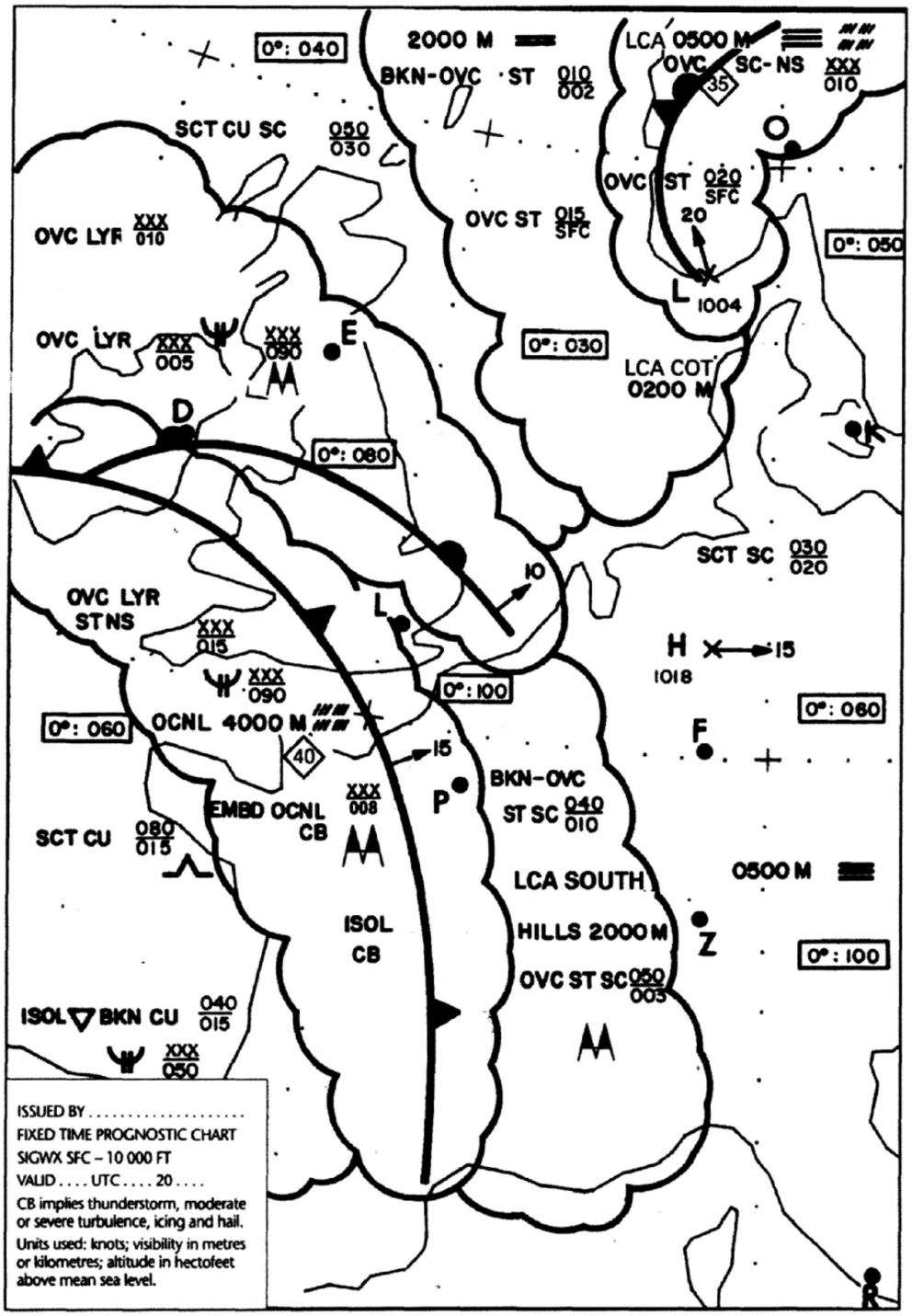
SIGNIFICANT WEATHER CHART (MEDIUM LEVEL) **MODEL SWM**



APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

SIGNIFICANT WEATHER CHART (LOW LEVEL)
Example 1

MODEL SWL



APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

SIGNIFICANT WEATHER CHART (LOW LEVEL)
Example 2

MODEL SWL

FIXED TIME PROGNOSTIC CHART — VALID ..... UTC ..... 20 .... BASED ON ..... UTC DATA ON .....

VARIANT	VIS	SIGNIFICANT WEATHER	CLOUD, TURBULENCE, ICING	0°C
AREA A			SCT CU 025/080	50
ISOL			BKN CU 015/XXX 050/XXX	
AREA B			OVC LYR ST NS 015/XXX 050/XXX	50
OCNL	4000	HEAVY RAIN	EMBD CB 008/XXX	
ISOL	1000	THUNDERSTORM		
AREA C			BKN to OVC ST SC 010/040	100
LCA SOUTH COT HILLS	2000	DRIZZLE	OVC ST SC 003/050	
AREA D			OVC LYR SC NS 010/XXX	90
LCA NORTH	4500	RAIN	OVC LYR ST NS 005/XXX 090/XXX	
AREA E			SCT SC 020/030	40
LCA LAND	0500	FOG		
AREA F	2000	MIST	BKN to OVC ST 002/010	30
LCA COT HILLS	0200	FOG	OVC ST SFC/015	
AREA G	4500	RAIN	OVC CU SC NS 010/XXX 030/XXX	30
LCA NORTH	0500	FOG	OVC ST SFC/010	
AREA J			SCT CU SC 030/050	40
LCA HILLS NORTH			BLW 070	

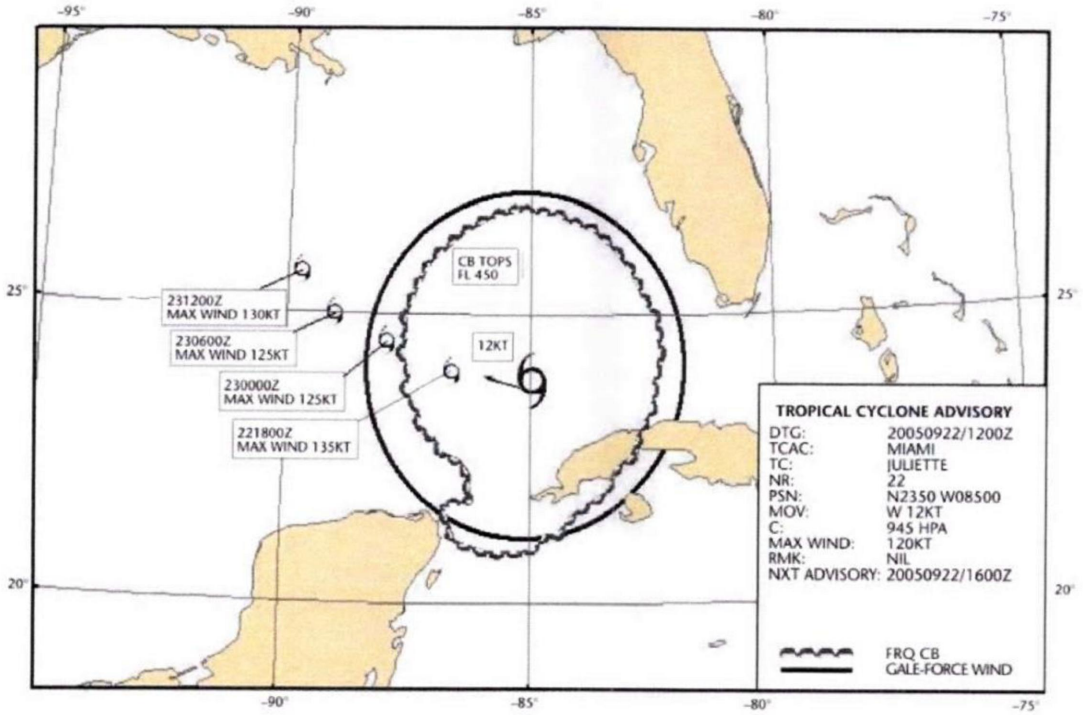
REMARKS:
EAST TO NE GALES SHETLAND TO HEBRIDES - SEVERE MOUNTAIN WAVES NW SCOTLAND –
FOG PATCHES EAST ANGLIA – WDSPR FOG OVER NORTH FRANCE, BELGIUM AND THE NETHERLANDS

SIGWX SFC – 10 000 FT
ISSUED BY ..... AT ..... UTC

Notes:
1. Pressure in hPa and speeds in knots.
2. Vis in m included if less than 5 000 m. M implies vis 200 m or less.
3. Altitude in hectofeet above MSL XXX = above 10 000 ft.
4. CB implies MOD/SEV icing, turbulence and thunderstorm.
5. Only significant weather and/or weather phenomena causing visibility reduction below 5 000 m included.

APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

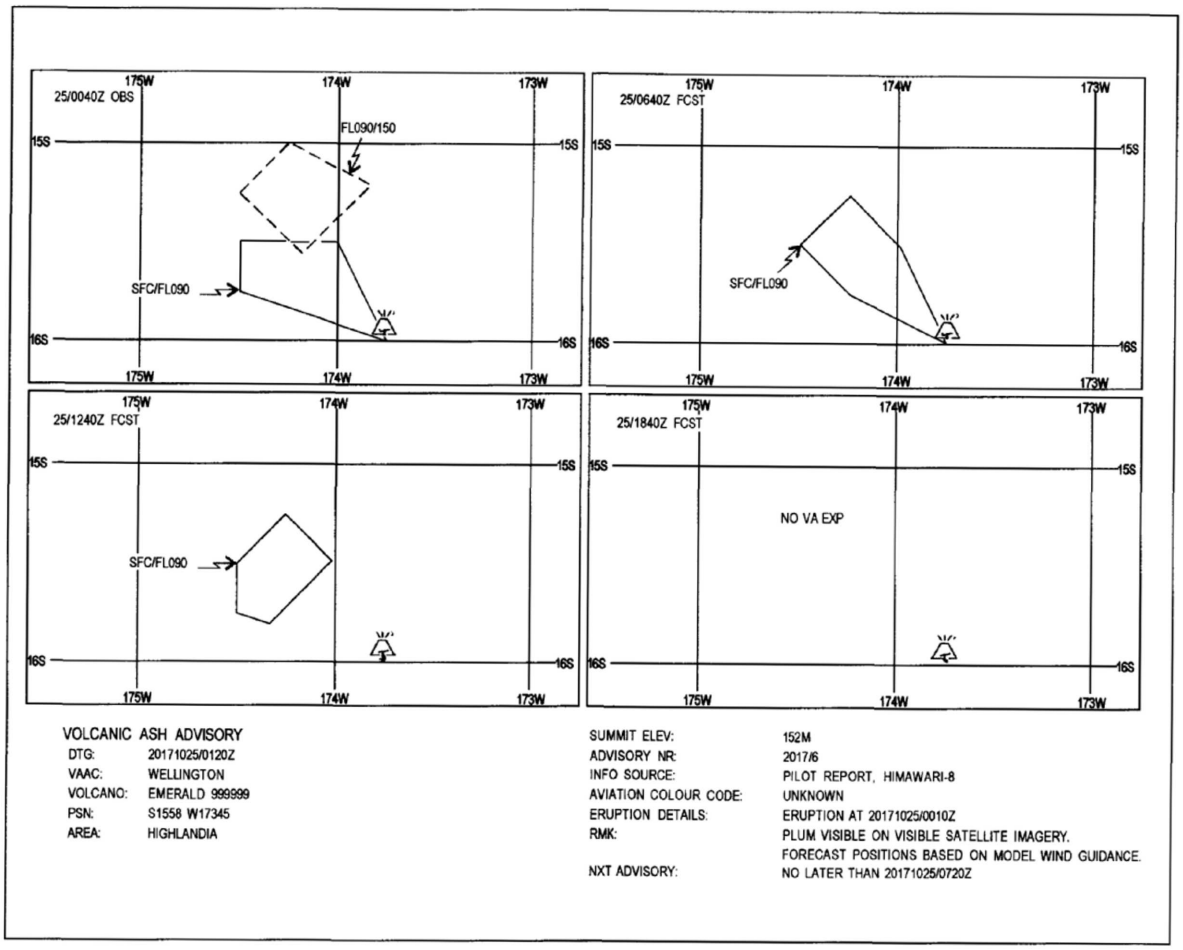
TROPICAL CYCLONE ADVISORY INFORMATION IN GRAPHICAL FORMAT **MODEL TCG**



APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

VOLCANIC ASH ADVISORY INFORMATION IN GRAPHICAL FORMAT **MODEL VAG**

Example 1. Mercator projection

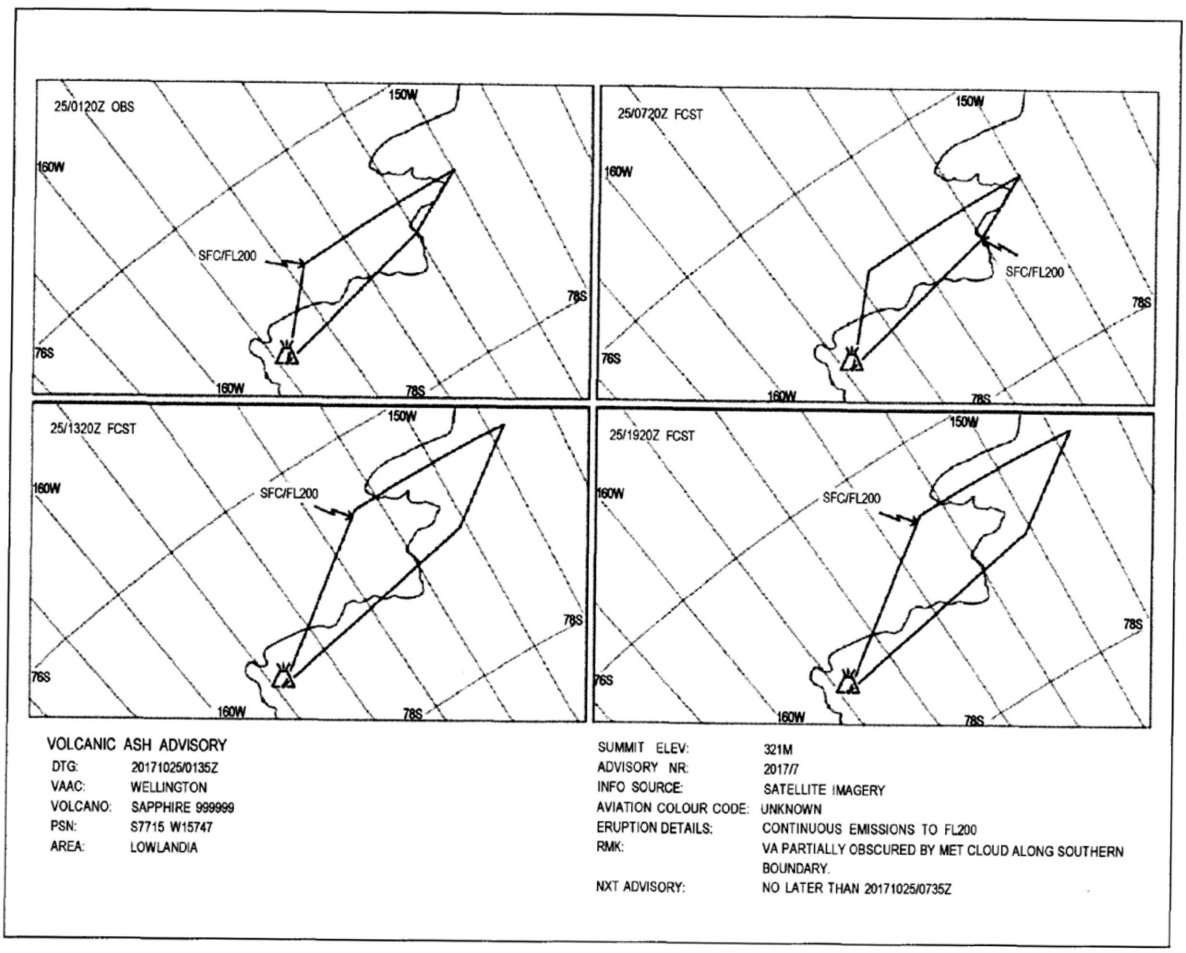


VOLCANIC ASH ADVISORY
DTG: 20171025/0120Z
VAAC: WELLINGTON
VOLCANO: EMERALD 999999
PSN: S1558 W17345
AREA: HIGHLANDIA

SUMMIT ELEV: 152M
ADVISORY NR: 2017/6
INFO SOURCE: PILOT REPORT, HIMAWARI-8
AVIATION COLOUR CODE: UNKNOWN
ERUPTION DETAILS: ERUPTION AT 20171025/0010Z
RMK: PLUM VISIBLE ON VISIBLE SATELLITE IMAGERY. FORECAST POSITIONS BASED ON MODEL WIND GUIDANCE.
NXT ADVISORY: NO LATER THAN 20171025/0720Z

APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

VOLCANIC ASH ADVISORY INFORMATION IN GRAPHICAL FORMAT **MODEL VAG**
Example 2. Polar stereographic projection

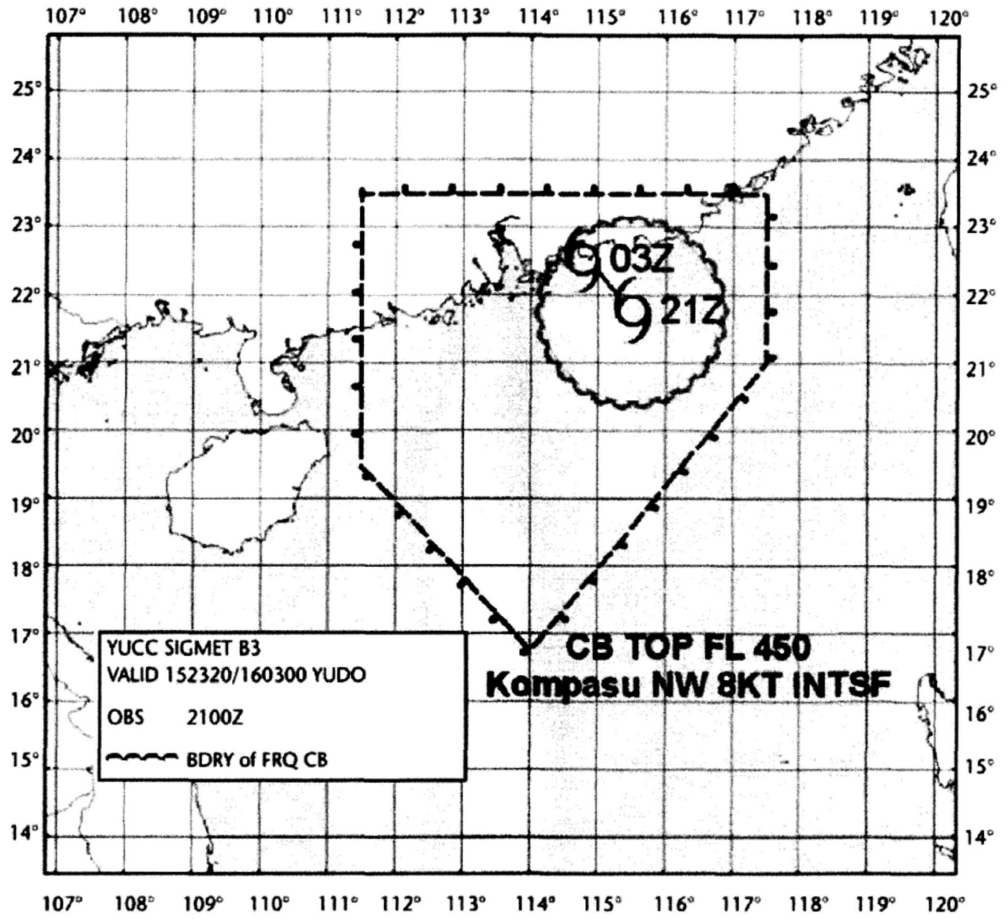


VOLCANIC ASH ADVISORY

DTG:	20171025/0135Z
VAAC:	WELLINGTON
VOLCANO:	SAPPHIRE 999999
PSN:	S7715 W15747
AREA:	LOWLANDIA
SUMMIT ELEV:	321M
ADVISORY NR:	2017/7
INFO SOURCE:	SATELLITE IMAGERY
AVIATION COLOUR CODE:	UNKNOWN
ERUPTION DETAILS:	CONTINUOUS EMISSIONS TO FL200
RMK:	VA PARTIALLY OBSCURED BY MET CLOUD ALONG SOUTHERN BOUNDARY.
NXT ADVISORY:	NO LATER THAN 20171025/0735Z

APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

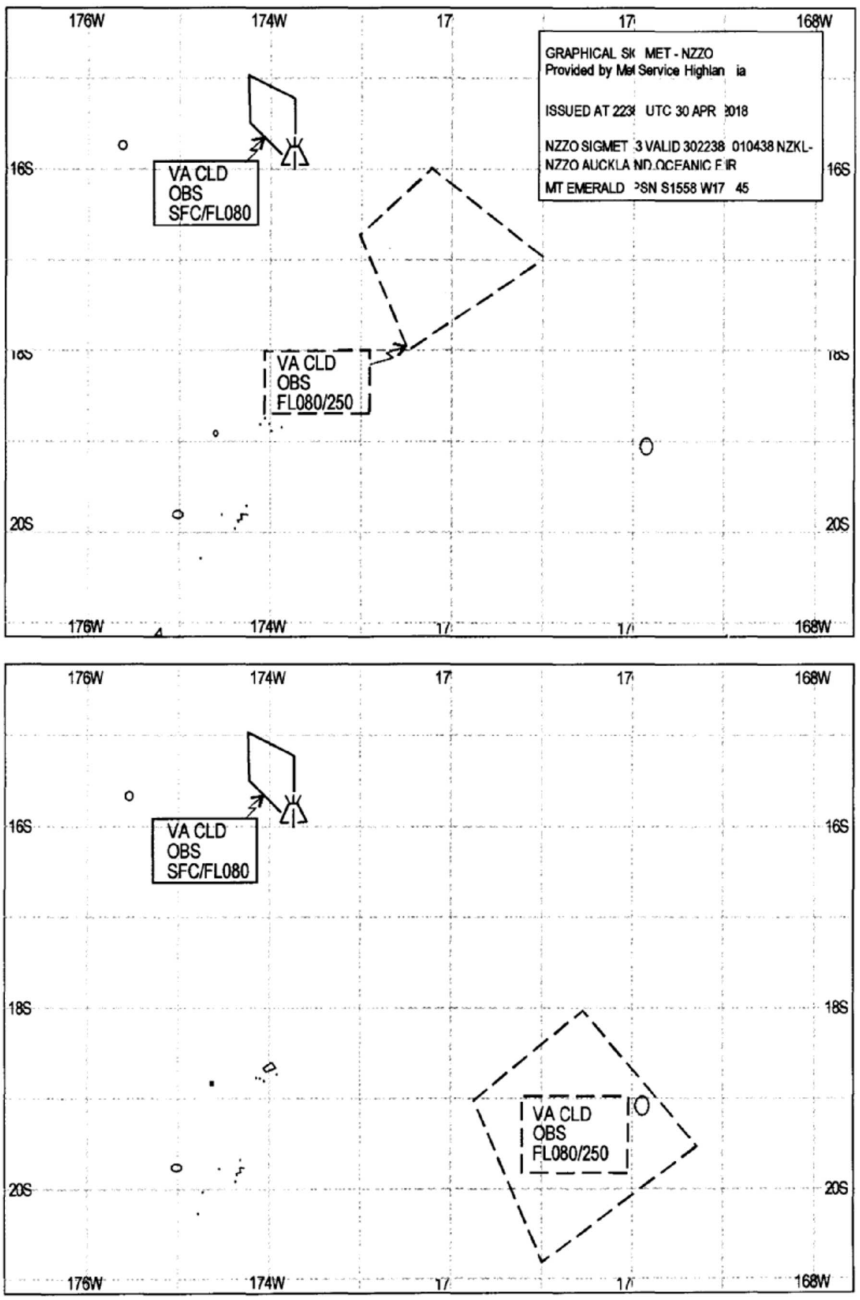
SIGMET FOR TROPICAL CYCLONE IN GRAPHICAL FORMAT **MODEL STC**



Note: Fictitious FIR.

APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

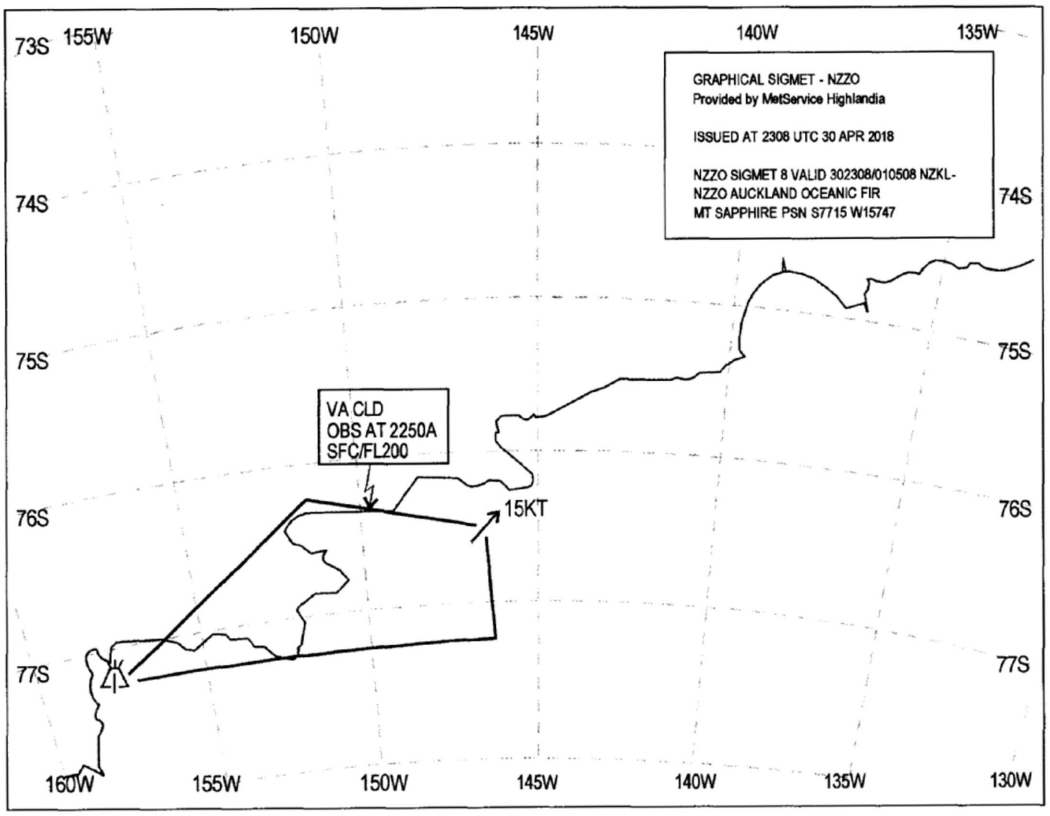
SIGMET FOR VOLCANIC ASH IN GRAPHICAL FORMAT **MODEL SVA**
Example 1. Mercator projection



APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

SIGMET FOR VOLCANIC ASH IN GRAPHICAL FORMAT **MODEL SVA**

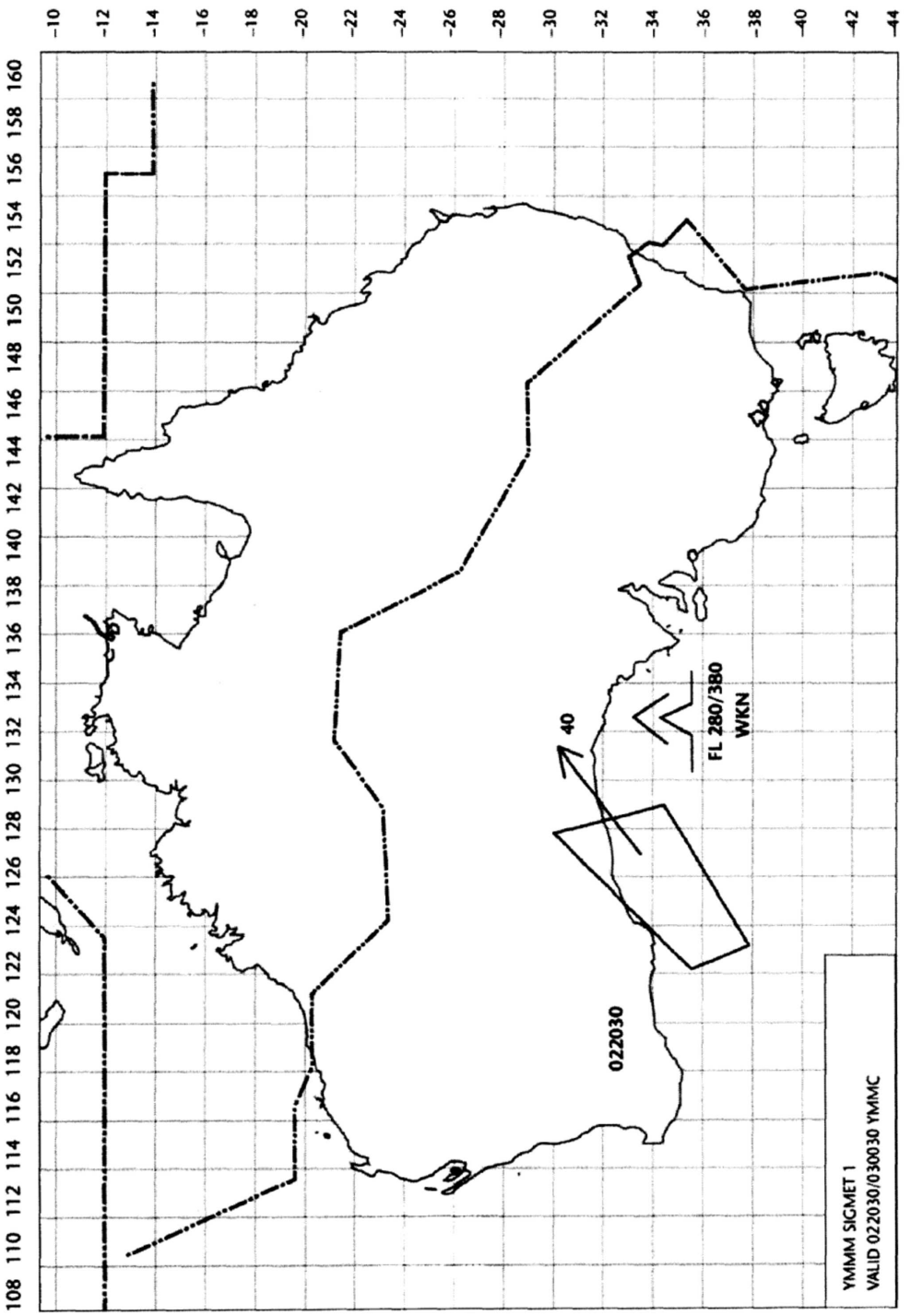
Example 1. Polar stereographic projection



APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

SIGMET FOR PHENOMENA OTHER THAN TROPICAL CYCLONE AND VOLCANIC ASH IN GRAPHICAL FORMAT

MODEL SGE



APPENDIX 1 – FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

SHEET OF NOTATIONS USED IN FLIGHT DOCUMENTATION

MODEL SN

1. Symbols for significant weather

	Tropical cyclone		Drizzle
	Severe squall line*		Rain
	Moderate turbulence		Snow
	Severe turbulence		Shower / Hail
	Mountain waves		Widespread blowing snow
	Moderate aircraft icing		Severe sand or dust haze
	Severe aircraft icing		Widespread sandstorm or duststorm
	Widespread fog		Widespread haze
	Radioactive materials in the atmosphere**		Widespread mist
	Volcanic eruption***		Widespread smoke
	Mountain obscuration		Freezing precipitation****

* In-flight documentation for flights operating up to FL 100. This symbol refers to "squall line".

** The following information should be included in a separate text box on the chart: radioactive materials in the atmosphere symbol; latitude/longitude of release site; and (if known) the name of the site of the radioactive source. In addition, the legend of SIGWX charts on which a release of radiation is indicated should contain "CHECK SIGMET AND NOTAM FOR RDOACT CLD". The centre of the radioactive materials in the atmosphere symbol should be placed on significant weather charts at the latitude/longitude site of the radioactive source.

*** The following information should be included in a separate text box on the chart: volcanic eruption symbol; the name of the volcano (if known); and the latitude/longitude of the eruption.

In addition, the legend of SIGWX charts should indicate "CHECK SIGMET, ADVISORIES FOR TC AND VA, AND ASHTAM AND NOTAM FOR VA". The dot on the base of the volcanic eruption symbol should be placed on significant weather charts at the latitude/longitude site of the volcanic event.

**** This symbol does not refer to icing due to precipitation coming into contact with an aircraft which is at a very low temperature.

Note: Height indications between which phenomena are expected, top above base as per chart legend.

2. Fronts and convergence zones and other symbols used

	Cold front at the surface	FL 370	Position, speed and level of maximum wind
	Warm front at the surface		Convergence line
	Occluded front at the surface	0°/-10°C	Freezing level
	Quasi-stationary front at the surface		Intertropical concergence zone
240	Tropopause high	10	State of the sea
270	Tropopause low	18	Sea-surface temperature
380	Tropopause level	40	Widespread strong surface wind*

FL 320 220/400 FL 310

Wind arrows indicate the maximum wind in jet and the flight level at which it occurs. If the maximum wind speed is 60 m/s (120 kt) or more, the flight levels between which winds are greater than 40 m/s (80 kt) is placed below the maximum wind level. In the example, winds are greater than 40 m/s (80 kt) between FL 220 and FL 400.

The heavy line delineating the jet axis begins/ends at the points where a wind speed of 40 m/s (80 kt) is forecast.

‡ Symbol used whenever the height of the jet axis changes by +/–3000 ft or the speed changes by +/–20 kt

* This symbol refers to widespread surface wind speeds exceeding 15 m/s (30 kt).

3. Abbreviations used to describe clouds

3.1 Type

CI	= Cirrus	AS	= Altostratus	ST	= Stratus
CC	= Cirrocumulus	NS	= Nimbostratus	CU	= Cumulus
CS	= Cirrostratus	SC	= Stratocumulus	CB	= Cumulonimbus
AC	= Altocumulus				

3.2 Amount

Clouds except CB

FEW	= few (1/8 to 2/8)	BKN	= broken (5/8 to 7/8)
SCT	= scattered (3/8 to 4/8)	OVC	= overcast (8/8)

CB only

ISOL	= individual CBs (isolated)
OCNL	= well-separated CBs (occasional)
FRQ	= CBs with little or no separation (frequent)
EMBD	= CBs embedded in layers of other clouds or concealed by haze (embedded)

3.3 Heights

Heights are indicated on SWH and SWM charts in flight levels (FL), top over base. When XXX is used, tops or bases are outside the layer of the atmosphere to which the chart applies.

In SWL charts:

(a) Heights are indicated as altitudes above mean sea level;

(b) The abbreviation SFC is used to indicate ground level.

4. Depicting of lines and systems on specific charts

4.1 Models SWH and SWM – Significant weather charts (high and medium)

Scalloped line	=	demarcation of areas of significant weather
Heavy broken line	=	delineation of area of CAT
Heavy solid line interrupted by wind arrow and flight level	=	position of jet stream axis with indication of wind direction, speed in kt or m/s and height in flight levels. The vertical extent of the jet stream is indicated (in flight levels), e.g. FL 270 accompanied by 240/290 indicates that the jet extends from FL 240 to FL 290.
Flight levels inside small rectangles	=	height in flight levels of tropopause at spot locations, e.g. 240. Low and high points of the tropopause topography are indicated by the letters L or H, respectively, inside a pentagon with the height in flight levels. Display explicit FL for jet depths and tropopause height even if outside forecast bounds.

4.2 Model SWL – Significant weather chart (low level)

X	=	position of pressure centres given in hectopascals
L	=	centre of low pressure
H	=	centre of high pressure
Scalloped lines	=	demarcation of area of significant weather
Dashed lines	=	altitude of 0°C isotherm in feet (hectofeet) or metres Note: 0°C level may also be indicated by 0°/060, i.e. 0°C level is at an altitude of 6000 ft.
Figures on arrows	=	speed in kt or km/h of movement of frontal systems, depressions or anticyclones
Figure inside the state of the sea symbol	=	total wave height in feet or metres
Figure inside the sea-surface temperature	=	sea-surface temperature in °C
Figures inside the strong surface wind symbol	=	wind in kt or m/s

4.3 Arrows, feathers and pennants

Arrows indicate direction. Number of pennants and/or feathers correspond to speed.

Example: 270°/115 kt (equivalent to 57.5 m/s)
Pennants correspond to 50 kt or 25 m/s
Feathers correspond to 10 kt or 5 m/s
Half-feathers correspond to 5 kt or 2.5 m/s

* A conversion factor of 1 to 2 is used.

APPENDIX 2 – TECHNICAL SPECIFICATIONS RELATED TO GLOBAL SYSTEMS, SUPPORTING CENTRES AND METEOROLOGICAL OFFICES

Text in this Appendix that is formatted in the Franklin Gothic Book font (sample text) *is published for the guidance of the MET Provider.*

1. WORLD AREA FORECAST SYSTEM

1.1 Formats and codes

WAFCs) adopt uniform formats and codes for the supply of forecasts.

1.2 Upper-air gridded forecasts

1.2.1 The forecasts of upper winds; upper-air temperature; and humidity; direction, speed and flight level of maximum wind; flight level and temperature of tropopause, areas of cumulonimbus clouds, icing, turbulence, and geopotential altitude of flight levels are prepared four times a day by a WAFC and are valid for fixed valid times at 6, 9, 12, 15, 18, 21, 24, 27, 30, 33 and 36 hours after the time (0000, 0600, 1200 and 1800 UTC) of the synoptic data on which the forecasts were based. Each forecast is disseminated as soon as technically feasible but not later than 5 hours after standard time of observation.

1.2.2 The grid point forecasts prepared by a WAFC comprise:

a) wind and temperature data for flight levels 50 (850 hPa), 80 (750 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 210 (450 hPa), 240 (400 hPa), 270 (350 hPa), 300 (300 hPa), 320 (275 hPa), 340 (250 hPa), 360 (225 hPa), 390 (200 hPa), 410 (175 hPa), 450 (150 hPa), 480 (125 hPa) and 530 (100 hPa);

b) flight level and temperature of tropopause;

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

d) humidity data for flight levels 50 (850 hPa), 80 (750 hPa), 100 (700 hPa), 140 (600 hPa) and 180 (500 hPa);

e) horizontal extent and flight levels of base and top of cumulonimbus clouds;

f) icing for layers centred at flight levels 60 (800 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa) and 300 (300 hPa);

Note. — Layers centred at a flight level referred to in f) have a depth of 100 hPa.

g) turbulence for layers centred at flight levels 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa), 270 (350 hPa), 300 (300 hPa), 340 (250 hPa), 390 (200 hPa) and 450 (150 hPa); and

Note 1.— Layers centred at a flight level referred to in g) have a depth of 100 hPa for flight levels below 240, then 50 hPa for flight levels 240 and above.

Note 2. — Turbulence referred to in g) above encompasses all types of turbulence, including clear-air and in-cloud turbulence.

h) geopotential altitude data for flight levels 50 (850 hPa), 80 (750 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 210 (450 hPa), 240 (400 hPa), 270 (350 hPa), 300 (300 hPa), 320 (275 hPa), 340 (250 hPa), 360 (225 hPa), 390 (200 hPa), 410 (175 hPa), 450 (150 hPa), 480 (125 hPa) and 530 (100 hPa).

Note.— The exact pressure levels (hPa) for a), d), f), g), and h) are provided in the ICAO Manual of Aeronautical Meteorological Practice *(Doc 8896).*

1.2.3 The foregoing grid point forecasts are issued by a WAFC in binary code form using the GRIB code form prescribed by the World Meteorological Organization (WMO).

Note.— The GRIB code form is contained in the Manual on Codes *(WMO-No. 306), Volume I.2, Part B* — Binary Codes.

1.2.4 The foregoing grid point forecasts a), b), c), d) and h) are prepared by a WAFC in a regular grid with a horizontal resolution of 1.25° of latitude and longitude.

1.2.5 The foregoing grid point forecasts e), f) and g) are prepared by a WAFC in a regular grid with a horizontal resolution of 0.25° of latitude and longitude.

1.3 Significant weather (SIGWX) forecasts

1.3.1 General provisions

1.3.1.1 Forecasts of significant en-route weather phenomena are prepared as SIGWX forecasts four times a day by a WAFC and are valid for fixed valid times at 24 hours after the time (0000, 0600, 1200 and 1800 UTC) of the synoptic data on which the forecasts were based. Each forecast is disseminated as soon as technically feasible but not later than 7 hours after standard time of observation under normal operations and not later than 9 hours after standard time of observation during backup operations.

1.3.1.2 SIGWX forecasts are issued in binary code form using the BUFR code form prescribed by WMO.

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

1.3.1.3 SIGWX forecasts may be disseminated in IWXXM GML form.

Note 1.— Guidance on the implementation of IWXXM is provided in the Manual on the ICAO Meteorological Information Exchange Model (IWXXM) *(Doc 10003).*

Note 2. — Geography markup language (GML) is an encoding standard of the Open Geospatial Consortium (OGC).

1.3.2 Types of SIGWX forecasts

SIGWX forecasts are issued as high-level SIGWX forecasts for flight levels between 250 and 630.

Note.— Medium-level SIGWX forecasts for flight levels between 100 and 250 for limited geographical areas will continue to be issued until such time that flight documentation to be generated from the gridded forecasts of cumulonimbus clouds, icing and turbulence fully meets user requirements.

1.3.3 Items included in SIGWX forecasts

SIGWX forecasts include the following items:

a) tropical cyclone provided that the maximum of the 10-minute mean surface wind speed is expected to reach or exceed 17 m/s (34 kt);

b) severe squall lines;

c) moderate or severe turbulence (in cloud or clear-air);

d) moderate or severe icing;

e) widespread sandstorm/duststorm;

f) cumulonimbus clouds associated with thunderstorms and with a) to e);

Note.— Non-convective cloud areas associated with in-cloud moderate or severe turbulence and/or moderate or severe icing are to be included in the SIGWX forecasts.

g) flight level of tropopause;

h) jet streams;

i) information on the location of volcanic eruptions that are producing ash clouds of significance to aircraft operations, comprising: volcanic eruption symbol at the location of

the volcano and, in a separate text box on the chart, the volcanic eruption symbol, the name of the volcano (if known) and the latitude/longitude of the eruption. In addition, the legend of SIGWX charts should indicate "CHECK SIGMET, ADVISORIES FOR TC AND VA, AND ASHTAM AND NOTAM FOR VA"; and

j) information on the location of a release of radioactive materials into the atmosphere of significance to aircraft operations, comprising: the radioactive materials in the atmosphere symbol at the location of the release and, in a separate text box on the chart, the radioactive materials in the atmosphere symbol, latitude/longitude of the site of the release, and (if known) the name of site of the radioactive source. In addition, the legend of SIGWX charts on which a release of radiation is indicated should contain "CHECK SIGMET AND NOTAM FOR RDOACT CLD".

Note 1.— Medium-level SIGWX forecasts include all the items above.

Note 2.— Items to be included in low-level SIGWX forecasts (i.e. flight levels below 100) are included in Appendix 5.

1.3.4 Criteria for including items in SIGWX forecasts

The following criteria are applied for SIGWX forecasts:

a) items a) to f) in 1.3.3 are only included if expected to occur between the lower and upper levels of the SIGWX forecast;

b) the abbreviation "CB" is only included when it refers to the occurrence or expected occurrence of cumulonimbus clouds:

1) affecting an area with a maximum spatial coverage of 50 per cent or more of the area concerned;

2) along a line with little or no space between individual clouds; or

3) embedded in cloud layers or concealed by haze;

c) the inclusion of "CB" is understood to include all weather phenomena normally associated with cumulonimbus clouds, i.e. thunderstorm, moderate or severe icing, moderate or severe turbulence and hail;

d) where a volcanic eruption or a release of radioactive materials into the atmosphere warrants the inclusion of the volcanic eruption symbol or the radioactive materials in the atmosphere symbol in SIGWX forecasts, the symbols are included on SIGWX forecasts irrespective of the height to which the ash column or radioactive material is reported or expected to reach; and

e) in the case of co-incident or the partial overlapping of items a), i) and j) in 1.3.3, the highest priority is given to item i), followed by items j) and a). The item with the highest priority is placed at the location of the event, and an arrow is used to link the location of the other item(s) to its associated symbol or text box.

2. AERODROME METEOROLOGICAL OFFICES

2.1 Use of world area forecast system (WAFS) products

2.1.1 Aerodrome meteorological offices shall use WAFS forecasts issued by the WAFCs in the preparation of flight documentation, whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the MET Provider and the operator concerned.

Note: The ICAO Annex 3, Appendix 6, Figures A8-1, A8-2, A8-3 depict fixed areas of coverage of WAFS forecasts in chart form.

2.1.2 In order to ensure uniformity and standardization of flight documentation:

(a) the WAFS GRIB;

(b) BUFR data received; and

(c) IWXXM data received;

shall be decoded into standard WAFS charts in accordance with relevant provisions in these Requirements, and the meteorological content and identification of the originator of the WAFS forecasts shall not be amended.

2.2 Notification of WAFC concerning significant discrepancies

The MET Provider shall ensure that the WAFC concerned is notified immediately if significant discrepancies are detected or reported by aerodrome meteorological offices using WAFS BUFR or IWXXM data in respect of WAFS SIGWX forecasts concerning:

a) icing, turbulence, cumulonimbus clouds that are obscured, frequent, embedded or occurring at a squall line, and sandstorms/duststorms; and

b) volcanic eruptions or a release of radioactive materials into the atmosphere, of significance to aircraft operations. The WAFC receiving the message shall acknowledge its receipt to the originator, together with a brief comment on the report and any action taken, using the same means of communication employed by the originator.

3. VOLCANIC ASH ADVISORY CENTRES

3.1 Volcanic ash advisory information

3.1.1 The advisory information on volcanic ash issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, are in accordance with the template shown in the ICAO Annex 3, Appendix 2, Table A2-1. When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, is used.

3.1.2 Volcanic ash advisory information is disseminated in IWXXM GML form in addition to the dissemination of this advisory information in accordance with 3.1.1.

Note 1.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D* — Representation Derived from Data Models. *Guidance on the implementation of IWXXM is provided in the* Manual on the ICAO Meteorological Information Exchange Model (IWXXM) *(Doc 10003).*

Note 2. — Geography markup language (GML) is an encoding standard of the Open Geospatial Consortium (OGC).

3.1.3 The volcanic ash advisory information listed in the ICAO Annex 3, Appendix 2, Table A2-1, when prepared in graphical format, is as specified in Appendix 1 and issued using the portable network graphics (PNG) format.

Example A2-1. Advisory message for volcanic ash.

VA ADVISORY	
DTG:	20080923/0130Z
VAAC:	TOKYO
VOLCANO:	KARYMSKY 300130
PSN:	N5403 E15927
AREA:	RUSSIA
SUMMIT ELEV:	1536M
ADVISORY NR:	2008/4
INFO SOURCE:	HIMAWARI-8 KVERT KEMSD
AVIATION COLOUR CODE:	RED
ERUPTION DETAILS:	ERUPTION AT 20080923/0000Z FL300 REPORTED
OBS VA DTG:	23/0100Z
OBS VA CLD:	FL250/300 N5400 E15930 – N5400 E16100 – N5300 E15945 MOV SE 20KT SFC/FL200 N5130 E16130 – N5130 E16230 – N5230 E16230 – N5230 E16130 MOV SE 15KT
FCST VA CLD +6 HR:	23/0700Z FL250/350 N5130 E16030 – N5130 E16230 – N5330 E16230 – N5330 E16030 SFC/FL180 N4830 E16330 – N4830 E16630 – N5130 E16630 – N5130 E16330
FCST VA CLD +12 HR:	23/1300Z SFC/FL270 N4830 E16130 – N4830 E16600 – N5300 E16600 – N5300 E16130
FCST VA CLD +18 HR:	23/1900Z NO VA EXP
RMK:	LATEST REP FM KVERT (0120Z) INDICATES ERUPTION HAS CEASED. TWO DISPERSING VA CLD ARE EVIDENT ON SATELLITE IMAGERY
NXT ADVISORY:	20080923/0730Z

4. STATE VOLCANO OBSERVATORIES

4.1 Information from State volcano observatories

The information required to be sent by State volcano observatories to their associated area control centres (ACCs)/flight information centres (FICs), meteorological watch office (MWO) and VAAC should comprise:

a) for significant pre-eruption volcanic activity: the date/time (UTC) of report; name and, if known, number of the volcano; location (latitude/longitude); and description of volcanic activity; and

b) for volcanic eruption: the date/time (UTC) of report and time of eruption (UTC) if different from time of report; name and, if known, number of the volcano; location (latitude/longitude); and description of the eruption including whether an ash column was ejected and, if so, an estimate of height of ash column and the extent of any visible volcanic ash cloud, during and following an eruption; and

c) for volcanic eruption cessation: the date/time (UTC) of report and time of eruption cessation (UTC); name and, if known, number of the volcano; and location (latitude/longitude).

Note 1.— Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

Note 2.— The State volcano observatories may use the Volcano Observatory Notice for Aviation (VONA) format to send information to their associated ACCs/FICs, MWO and VAAC. The VONA format is included in the ICAO Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List (Doc 9766).

5. TROPICAL CYCLONE ADVISORY CENTRES

5.1 Tropical cyclone advisory information

5.1.1 The advisory information on tropical cyclones is issued for tropical cyclones when the maximum of the 10-minute mean surface wind speed is expected to reach or exceed 17 m/s (34 kt) during the period covered by the advisory.

5.1.2 The advisory information on tropical cyclones disseminated in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-

explanatory nature, is in accordance with the template shown in the ICAO Annex 3, Appendix 2, Table A2-2.

5.1.3 TCACs disseminate tropical cyclone advisory information in IWXXM GML form in addition to the dissemination of this advisory information in abbreviated plain language in accordance with 5.1.2.

Note 1.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D* — Representation Derived from Data Models*. Guidance on the implementation of IWXXM is provided in* Manual on the ICAO Meteorological Information Exchange Model (IWXXM) *(Doc 10003).*

Note 2. — Geography markup language (GML) is an encoding standard of the Open Geospatial Consortium (OGC).

5.1.4 The tropical cyclone advisory information listed in the ICAO Annex 3, Appendix 2, Table A2-2, when prepared in graphical format, is as specified in Appendix 1 and issued using the PNG format.

Example A2-2. Advisory message for tropical cyclones

TC ADVISORY	
DTG:	20040925/1900Z
TCAC:	YUFO*
TC:	GLORIA
ADVISORY NR:	2004/13
OBS PSN:	25/1800Z N2706 W07306
CB:	WI 250NM OF TC CENTRE TOP FL500
MOV:	NW 20KMH
INTST CHANGE	INTSF
C:	965HPA
MAX WIND:	25MPS
FCST PSN +6 HR:	25/2200Z N2748 W07350
FCST MAX WIND +6 HR:	22MPS
FCST PSN +12 HR:	26/0400Z N2830 W07430
FCST MAX WIND +12 HR:	22MPS
FCST PSN +18 HR:	26/1000Z N2852 W07500
FCST MAX WIND +18 HR:	21MPS
FCST PSN +24 HR:	26/1600Z N2912 W07530
FCST MAX WIND +24 HR:	20MPS
RMK:	NIL
NXT MSG:	20040925/2000Z
*Ficticious location	

6. SPACE WEATHER CENTRES

6.1 Space weather advisory information

6.1.1 Advisory information on space weather should be issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, and should be in accordance with the template shown in the ICAO Annex 3, Appendix 2, Table A2-3. When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, should be used.

6.1.2 Space weather advisory information is disseminated in IWXXM GML form, in addition to the dissemination of this advisory information in abbreviated plain language in accordance with 6.1.1.

Note 1.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO–No. 306), Volume I.3, Part D* — Representations Derived from Data

Models. *Guidance on the implementation of IWXXM is provided in the* Manual on the ICAO Meteorological Information Exchange Model (IWXXM) *(Doc 10003).*

Note 2. — Geography markup language (GML) is an encoding standard of the Open Geospatial Consortium (OGC).

6.1.3 One or more of the following space weather effects should be included in the space weather advisory information, using their respective abbreviations as indicated below:

HF communications (propagation, absorption)	*HF COM*
communications via satellite (propagation, absorption)	*SATCOM*
GNSS-based navigation and surveillance (degradation)	*GNSS*
radiation at flight levels (increased exposure)	*RADIATION*

6.1.4 The following intensities should be included in space weather advisory information, using their respective abbreviations as indicated below:

moderate	*MOD*
severe	*SEV*

Note.— Guidance on the use of these intensities is provided in the ICAO Manual on Space Weather Information in Support of International Air Navigation *(Doc 10100).*

6.1.5 Updated advisory information on space weather phenomena should be issued 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.

Example A2-3. Space weather advisory message (GNSS and HFCOM effects)

SWX ADVISORY	
DTG:	20161108/0100Z
SWXC:	DONLON*
ADVISORY NR:	2016/2
NR RPLC:	2016/1
SWX EFFECT:	HF COM MOD AND GNSS MOD
OBS SWX:	08/0100Z HNH HSH E18000 – W18000
FCST SWX +6 HR:	08/0700Z HNH HSH E18000 – W18000
FCST SWX +12 HR:	08/1300Z HNH HSH E18000 – W18000
FCST SWX +18 HR:	08/1900Z HNH HSH E18000 – W18000
FCST SWX +24 HR	09/0100Z NO SWX EXP
RMK:	LOW LVL GEOMAGNETIC STORMING CAUSING INCREASED AURORAL ACT AND SUBSEQUENT MOD DEGRADATION OF GNSS AND HF COM AVBL IN THE AURORAL ZONE. THIS STORMING EXP TO SUBSIDE IN THE FCST PERIOD. SEE WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY:	NO FURTHER ADVISORIES

* Ficticious location

Example A2-4. Space weather advisory message (RADIATION effects)

SWX ADVISORY	
DTG:	20161108/0000Z
SWXC:	DONLON*
ADVISORY NR:	2016/2
NR RPLC:	2016/1
SWX EFFECT:	RADIATION MOD
FCST SWX:	08/0100Z HNH HSH E18000 – W18000 ABV FL 350
FCST SWX +6 HR:	08/0700Z HNH HSH E18000 – W18000 ABV FL 350
FCST SWX +12 HR:	08/1300Z HNH HSH E18000 – W18000 ABV FL 350
FCST SWX +18 HR:	08/1900Z HNH HSH E18000 – W18000 ABV FL 350
FCST SWX +24 HR:	09/0100Z NO SWX EXP
RMK:	RADIATION LVL EXCEEDED 100 PCT OF BACKGROUND LVL AT FL350 AND ABV. THE CURRENT EVENT HAS PEAKED AND LVL SLW_RTN TO BACKGROUND LVL. SEE WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY:	NO FURTHER ADVISORIES

* Ficticious location

Example A2-5. Space weather advisory message (HF COM effects)

SWX ADVISORY	
DTG:	20161108/0100Z
SWXC:	DONLON*
ADVISORY NR:	2016/1
SWX EFFECT:	HF COM SEV
OBS SWX:	08/0100Z DAYLIGHT SIDE
FCST SWX +6 HR:	08/0700Z DAYLIGHT SIDE
FCST SWX +12 HR:	08/1300Z DAYLIGHT SIDE
FCST SWX +18 HR:	08/1900Z DAYLIGHT SIDE
FCST SWX +24 HR	09/0100Z NO SWX EXP
RMK:	PERIODIC HF COM ABSORPTION AND LIKELY TO CONT IN THE NEAR TERM. CMPL AND PERIODIC LOSS OF HF ON THE SUNLIT SIDE OF THE EARTH EXP. CONT HF COM DEGRADATION LIKELY OVER THE NXT 7 DAYS. SEE WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY:	20161108/0700Z

* Ficticious location

APPENDIX 3 – TECHNICAL SPECIFICATIONS RELATED TO METEOROLOGICAL OBSERVATIONS AND REPORTS

1. GENERAL PROVISIONS RELATED TO METEOROLOGICAL OBSERVATIONS

1.1 The meteorological instruments used at an aerodrome shall be situated in such a way as to supply data which are representative of the area for which the measurements are required.

1.2 Meteorological instruments at aeronautical meteorological stations shall be exposed, operated and maintained in accordance with the practices, procedures and specifications promulgated by the WMO.

1.3 The observers at an aerodrome shall 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.

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

2. GENERAL CRITERIA RELATED TO METEOROLOGICAL REPORTS

2.1 Format of meteorological reports

2.1.1 Local routine and special reports shall be issued in abbreviated plain language, in accordance with the template shown in the ICAO Annex 3, Appendix 3, Table A3-1.

2.1.2 METAR and SPECI shall be issued in accordance with the template shown in the ICAO Annex 3, Appendix 3, Table A3-2 and disseminated in the METAR and SPECI code forms prescribed by WMO.

Note.— The METAR and SPECI code forms are contained in the Manual on Codes *(WMO-No. 306), Volume I.1, Part A* — Alphanumeric Codes.

2.1.3 METAR and SPECI shall be disseminated in IWXXM GML form in addition to the dissemination of the METAR and SPECI in accordance with 2.1.2.

Note 1.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D* — Representation Derived from Data Models. *Guidance on the implementation of IWXXM is provided in* Manual on the ICAO Meteorological Information Exchange Model (IWXXM) *(Doc 10003).*

Note 2. — Geography markup language (GML) is an encoding standard of the Open Geospatial Consortium (OGC).

2.2 Use of CAVOK

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

a) visibility, 10 km or more, and the lowest visibility is not reported;

Note 1.— In local routine and special reports, visibility refers to the value(s) to be reported in accordance with 4.2.4.2 and 4.2.4.3; in METAR and SPECI, visibility refers to the value(s) to be reported in accordance with 4.2.4.4.

Note 2.— The lowest visibility is reported in accordance with 4.2.4.4 a).

b) no cloud of operational significance;

c) no weather of significance to aviation as given in 4.4.2.3, 4.4.2.5 and 4.4.2.6;

2.1.2 METAR and SPECI shall be issued in accordance with the template shown in the ICAO Annex 3, Appendix 3, Table A3-2 and disseminated in the METAR and SPECI code forms prescribed by WMO.

Note.— The METAR and SPECI code forms are contained in the Manual on Codes *(WMO-No. 306), Volume I.1, Part A* — Alphanumeric Codes.

2.1.3 METAR and SPECI shall be disseminated in IWXXM GML form in addition to the dissemination of the METAR and SPECI in accordance with 2.1.2.

Note 1.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D* — Representation Derived from Data Models. *Guidance on the implementation of IWXXM is provided in* Manual on the ICAO Meteorological Information Exchange Model (IWXXM) *(Doc 10003).*

Note 2. — Geography markup language (GML) is an encoding standard of the Open Geospatial Consortium (OGC).

2.2 Use of CAVOK

When the following conditions occur simultaneously at the time of observation:
a) visibility, 10 km or more, and the lowest visibility is not reported;

Note 1.— In local routine and special reports, visibility refers to the value(s) to be reported in accordance with 4.2.4.2 and 4.2.4.3; in METAR and SPECI, visibility refers to the value(s) to be reported in accordance with 4.2.4.4.

Note 2.— The lowest visibility is reported in accordance with 4.2.4.4 a).
b) no cloud of operational significance;
c) no weather of significance to aviation as given in 4.4.2.3, 4.4.2.5 and 4.4.2.6;

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

2.3 Criteria for issuance of local special reports and SPECI

2.3.1 The list of criteria for the issuance of local special reports shall include the following:

a) those values which most closely correspond with the operating minima of the operators using the aerodrome;

b) those values which satisfy other local requirements of the ATS units and of the operators;

c) an increase in air temperature of 2°C or more from that given in the latest report, or an alternative threshold value as agreed between the MET Provider, the ATS Provider and the operators concerned;

d) the available supplementary information concerning the occurrence of significant meteorological conditions in the approach and climb-out areas as given in the ICAO Annex 3, Appendix 3, Table A3-1;

e) when noise abatement procedures are applied in accordance with the ICAO PANS-ATM (Doc 4444) and the variation from the mean surface wind speed (gusts) has changed by 2.5 m/s (5 kt) or more from that at the time of the latest report, the mean speed before and/or after the change being 7.5 m/s (15 kt) or more; and

f) those values which constitute criteria for SPECI.

2.3.2 Where required in accordance with Chapter 3, 2.4.2 b), SPECI shall be issued whenever changes in accordance with the following criteria occur:

a) when the mean surface wind direction has changed by 60° or more from that given in the latest report, the mean speed before and/or after the change being 5 m/s (10 kt) or more;

b) when the mean surface wind speed has changed by 5 m/s (10 kt) or more from that given in the latest report; c) when the variation from the mean surface wind speed (gusts) has changed by 5 m/s (10 kt) or more from that at the time of the latest report, the mean speed before and/or after the change being 7.5 m/s (15 kt) or more;

d) when the onset, cessation or change in intensity of any of the following weather phenomena occurs:

— freezing precipitation

— moderate or heavy precipitation (including showers thereof)

— thunderstorm (with precipitation);

e) when the onset or cessation of any of the following weather phenomena occurs:

— freezing fog

— thunderstorm (without precipitation);

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

1) from SCT or less to BKN or OVC; or

2) from BKN or OVC to SCT or less.

2.3.3 When a deterioration of one weather element is accompanied by an improvement in another element, a single SPECI shall be issued; it shall then be treated as a deterioration report.

3. DISSEMINATION OF METEOROLOGICAL REPORTS

3.1 METAR and SPECI

3.1.1 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.

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

3.1.3 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.

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

3.2 Local routine and special reports

3.2.1 Local routine reports shall be transmitted to local ATS units and shall be made available to the operators and to other users at the aerodrome.

3.2.2 Local special reports shall be transmitted to local ATS units as soon as the specified conditions occur. However, as agreed between the MET Provider and the ATS Provider, they need not be issued in respect of:

a) any element for which there is in the local ATS 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 and special reports; 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 ATS 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.

4. OBSERVING AND REPORTING OF METEOROLOGICAL ELEMENTS

4.1 Surface wind

4.1.1 Siting

4.1.1.1 Surface wind shall be observed at a height of 10 ± 1 m (30 ± 3 ft) above the ground.

4.1.1.2 Representative surface wind observations shall be obtained by the use of sensors appropriately sited. Sensors for surface wind observations for local routine and special reports shall be sited to give the best practicable indication of conditions along the runway and touchdown zones. At aerodromes where topography or prevalent weather conditions cause significant differences in surface wind at various sections of the runway, additional sensors shall be provided.

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

4.1.2 Displays

4.1.2.1 Surface wind displays relating to each sensor shall be located in the meteorological station with corresponding displays in the appropriate ATS units. The displays in the meteorological station and in the ATS units shall relate to the same sensors, and where separate sensors are required as specified in 4.1.1.2, the displays shall be clearly marked to identify the runway and section of runway monitored by each sensor.

4.1.2.2 The mean values of, and significant variations in, the surface wind direction and speed for each sensor shall be derived and displayed by automated equipment

4.1.3 Averaging

4.1.3.1 The averaging period for surface wind observations shall be:

a) 2 minutes for local routine and special reports and for wind displays in ATS units; and

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

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in wind direction of 30° or more, with a wind speed of 5 m/s (10 kt) before or after the change, or a change in wind speed of 5 m/s (10 kt) or more, lasting at least 2 minutes.

4.1.3.2 The averaging period for measuring variations from the mean wind speed (gusts) reported in accordance with 4.1.5.2 c) shall be 3 seconds for local routine reports, local special reports, METAR, SPECI and wind displays used for depicting variations from the mean wind speed (gusts) in air traffic services units.

4.1.4 Accuracy of measurement

The reported direction and speed of the mean surface wind, as well as variations from the mean surface wind, should meet the operationally desirable accuracy of measurement as given in Attachment A.

4.1.5 Reporting

4.1.5.1 In local routine reports, local special reports, METAR and SPECI, the surface wind direction and speed shall be reported in steps of 10 degrees true and 1 metre per second (or 1 knot), respectively. Any observed value which does not fit the reporting scale in use shall be rounded to the nearest step in the scale.

4.1.5.2 In local routine reports, local special reports, METAR and SPECI:

a) the units of measurement used for the wind speed shall be indicated;

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

1) when the total variation is 60° or more and less than 180° and the wind speed is 1.5 m/s (3 kt) or more, such directional variations shall be reported as the two extreme directions between which the surface wind has varied;

2) when the total variation is 60° or more and less than 180° and the wind speed is less than 1.5 m/s (3 kt), the wind direction shall be reported as variable with no mean wind direction; or

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

c) variations from the mean wind speed (gusts) during the past 10 minutes shall be reported when the maximum wind speed exceeds the mean speed by:

1) 2.5 m/s (5 kt) or more in local routine and special reports when noise abatement procedures are applied in accordance with the PANS-ATM (Doc 4444); or

2) 5 m/s (10 kt) or more otherwise;

d) when a wind speed of less than 0.5 m/s (1 kt) is reported, it shall be indicated as calm;

e) when a wind speed of 50 m/s (100 kt) or more is reported, it shall be indicated to be more than 49 m/s (99 kt); and

f) when the 10-minute period includes a marked discontinuity in the wind direction and/or speed, only variations from the mean wind direction and mean wind speed occurring since the discontinuity shall be reported.

Note.— See note under 4.1.3.1.

4.1.5.3 In local routine and special reports:

a) if the surface wind is observed from more than one location along the runway, the locations for which these values are representative shall be indicated;

b) when there is more than one runway in use and the surface wind related to these runways is observed, the available wind values for each runway shall be given, and the runways to which the values refer shall be reported;

c) when variations from the mean wind direction are reported in accordance with 4.1.5.2 b) 2), the two extreme directions between which the surface wind has varied shall be reported; and

d) when variations from the mean wind speed (gusts) are reported in accordance with 4.1.5.2 c), they shall be reported as the maximum and minimum values of the wind speed attained.

4.1.5.4 In METAR and SPECI, when variations from the mean wind speed (gusts) are reported in accordance with 4.1.5.2 c), the maximum value of the wind speed attained shall be reported.

4.2 Visibility

4.2.1 Siting

4.2.1.1 When instrumented systems are used for the measurement of visibility, the visibility shall be measured at a height of approximately 2.5 m (7.5 ft) above the runway.

4.2.1.2 When instrumented systems are used for the measurement of visibility, representative visibility observations shall be obtained by the use of sensors appropriately sited. Sensors for visibility observations for local routine and special reports shall be sited to give the best practicable indications of visibility along the runway and touchdown zone.

4.2.2 Displays

When instrumented systems are used for the measurement of visibility, visibility displays relating to each sensor shall be located in the meteorological station with corresponding displays

in the appropriate ATS units. The displays in the meteorological station and in the ATS units shall relate to the same sensors, and where separate sensors are required as specified in 4.2.1, the displays shall be clearly marked to identify the area, e.g. runway and section of runway, monitored by each sensor.

4.2.3 Averaging

When instrumented systems are used for the measurement of visibility, their output should be updated at least every 60 seconds to permit provision of current representative values. The averaging period should be:

a) 1 minute for local routine and special reports and for visibility displays in ATS units; and

b) 10 minutes for METAR and SPECI, except that when the 10-minute period immediately preceding the observation includes a marked discontinuity in the visibility, only those values occurring after the discontinuity should be used for obtaining mean values.

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in visibility, lasting at least 2 minutes, which reaches or passes through criteria for the issuance of SPECI reports given in 2.3.

4.2.4 Reporting

4.2.4.1 In local routine reports, local special reports, METAR and SPECI, the visibility shall be reported in steps of 50 m when it is less than 800 m; in steps of 100 m when it is 800 m or more but less than 5 km; in kilometre steps when it is 5 km or more but less than 10 km; and as 10 km when it is 10 km or more except when the conditions for the use of CAVOK apply. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

4.2.4.2 In local routine and special reports, visibility along the runway(s) shall be reported together with the units of measurement used to indicate visibility.

4.2.4.3 In local routine and special reports, when instrumented systems are used for the measurement of visibility:

a) if the visibility is observed from more than one location along the runway as specified in Chapter 3, 3.6.2.2, the values representative of the touchdown zone shall be reported first, followed, as necessary, by the values representative of the mid-point and stop-end of the runway, and the locations for which these values are representative should be indicated; and

b) when there is more than one runway in use and the visibility is observed related to these runways, the available visibility values for each runway shall be reported, and the runways to which the values refer shall be indicated.

4.2.4.4 In METAR and SPECI, visibility shall be reported as prevailing visibility. When the visibility is not the same in different directions and

a) when the lowest visibility is different from the prevailing visibility, and 1) less than 1 500 m or 2) less than 50 per cent of the prevailing visibility and less than 5 000 m; the lowest visibility observed shall also be reported and, when possible, its general direction in relation to the aerodrome reference point indicated by reference to one of the eight points of the compass. If the lowest visibility is observed in more than one direction, then the most operationally significant direction shall be reported; and

b) when the visibility is fluctuating rapidly, and the prevailing visibility cannot be determined, only the lowest visibility shall be reported, with no indication of direction.

4.3 Runway visual range

4.3.1 Siting

4.3.1.1 Runway visual range shall be assessed at a height of approximately 2.5 m (7.5 ft) above the runway for instrumented systems or assessed at a height of approximately 5 m (15 ft) above the runway by a human observer.

4.3.1.2 Runway visual range shall be assessed at a lateral distance from the runway centre line of not more than 120 m. The site for observations to be representative of the touchdown zone shall be located about 300 m along the runway from the threshold. The sites for observations to be representative of the mid-point and stop-end of the runway shall be located at a distance of 1 000 to 1 500 m along the runway from the threshold and at a distance of about 300 m from the other end of the runway. The exact position of these sites and, if necessary, additional sites shall be decided after considering aeronautical, meteorological and climatological factors such as long runways, swamps and other fog-prone areas.

4.3.2 Instrumented systems

Note.— Since accuracy can vary from one instrument design to another, performance characteristics are to be checked before selecting an instrument for assessing runway visual range. The calibration of a forward-scatter meter has to be traceable and verifiable to a transmissometer standard, the accuracy of which has been verified over the intended operational range. Guidance on the use of transmissometers and forward-scatter meters in instrumented runway visual range systems is given in the ICAO Manual of Runway Visual Range Observing and Reporting Practices *(Doc 9328).*

4.3.2.1 Instrumented systems based on transmissometers or forward-scatter meters shall be used to assess runway visual range on runways intended for Category II and III instrument approach and landing operations.

4.3.2.2 *Instrumented systems based on transmissometers or forward-scatter meters should be used to assess runway visual range on runways intended for Category I instrument approach and landing operations.*

4.3.3 Display

4.3.3.1 Where runway visual range is determined by instrumented systems, one display or more, if required, shall be located in the meteorological station with corresponding displays in the appropriate ATS units. The displays in the meteorological station and in the ATS units shall be related to the same sensors, and where separate sensors are required as specified in 4.3.1.2, the displays shall be clearly marked to identify the runway and section of runway monitored by each sensor.

4.3.3.2 Where runway visual range is determined by human observers, runway visual range shall be reported to the appropriate local ATS units, whenever there is a change in the value to be reported in accordance with the reporting scale (except where the provisions of 3.2.2 a) or b) apply). The transmission of such reports shall normally be completed within 15 seconds after the termination of the observation.

4.3.4 Averaging

Where instrumented systems are used for the assessment of runway visual range, their output shall be updated at least every 60 seconds to permit the provision of current, representative values. The averaging period for runway visual range values shall be:

a) 1 minute for local routine and special reports and for runway visual range displays in ATS units; and

b) 10 minutes for METAR and SPECI, except that when the 10-minute period immediately preceding the observation includes a marked discontinuity in runway visual range values, only those values occurring after the discontinuity shall be used for obtaining mean values.

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in runway visual range, lasting at least 2 minutes, which reaches or passes through the values 800, 550, 300 and 175 m.

4.3.5 Runway light intensity

When instrumented systems are used for the assessment of runway visual range, computations shall be made separately for each available runway. For local routine and special reports, the light intensity to be used for the computation shall be:

a) for a runway with the lights switched on and a light intensity of more than 3 per cent of the maximum light intensity available, the light intensity actually in use on that runway;

b) for a runway with the lights switched on and a light intensity of 3 per cent or less of the maximum light intensity available, the optimum light intensity that would be appropriate for operational use in the prevailing conditions; and

c) for a runway with lights switched off (or at the lowest setting pending the resumption of operations), the optimum light intensity that would be appropriate for operational use in the prevailing conditions.

In METAR and SPECI, the runway visual range should be based on the maximum light intensity available on the runway.

4.3.6 Reporting

4.3.6.1 In local routine reports, local special reports, METAR and SPECI, the runway visual range shall be reported in steps of 25 m when it is less than 400 m; in steps of 50 m when it is between 400 m and 800 m; and in steps of 100 m when it is more than 800 m. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

4.3.6.2 Fifty metres shall be considered the lower limit and 2 000 metres the upper limit for runway visual range. Outside of these limits, local routine reports, local special reports, METAR and SPECI shall merely indicate that the runway visual range is less than 50 m or more than 2 000 m.

4.3.6.3 In local routine reports, local special reports, METAR and SPECI:

a) when runway visual range is above the maximum value that can be determined by the system in use, it shall be reported using the abbreviation "ABV" in local routine

and special reports and the abbreviation "P" in METAR and SPECI, followed by the maximum value that can be determined by the system; and

b) when the runway visual range is below the minimum value that can be determined by the system in use, it shall be reported using the abbreviation "BLW" in local routine and special reports and the abbreviation "M" in METAR and SPECI, followed by the minimum value that can be determined by the system.

4.3.6.4 In local routine and special reports:

a) the units of measurement used shall be included;

b) if runway visual range is observed from only one location along the runway, i.e. the touchdown zone, it shall be included without any indication of location;

c) if the runway visual range is observed from more than one location along the runway, the value representative of the touchdown zone shall be reported first, followed by the values representative of the mid-point and stop-end and the locations for which these values are representative shall be indicated; and

d) when there is more than one runway in use, the available runway visual range values for each runway shall be reported and the runways to which the values refer shall be indicated.

4.3.6.5 In METAR and SPECI:

a) only the value representative of the touchdown zone should be reported and no indication of location on the runway shall be included; and

b) where there is more than one runway available for landing, touchdown zone runway visual range values shall be included for all such runways, up to a maximum of four, and the runways to which the values refer shall be indicated.

4.3.6.6 In METAR and SPECI when instrumented systems are used for the assessment of runway visual range, the variations in runway visual range during the 10-minute period immediately preceding the observation shall be included if the runway visual range values during the 10-minute period have shown a distinct tendency, such that the mean during the first 5 minutes varies by 100 m or more from the mean during

the second 5 minutes of the period. When the variation of the runway visual range values shows an upward or downward tendency, this shall be indicated by the abbreviation "U" or "D", respectively. In circumstances when actual fluctuations during the 10-minute period show no distinct tendency, this shall be indicated using the abbreviation "N". When indications of tendency are not available, no abbreviations shall be included.

4.4 Present weather

4.4.1 Siting

When instrumented systems are used for observing present weather phenomena listed under 4.4.2.3 and 4.4.2.4, representative information shall be obtained by the use of sensors appropriately sited.

4.4.2 Reporting

4.4.2.1 In local routine and special reports, observed present weather phenomena shall be reported in terms of type and characteristics and qualified with respect to intensity, as appropriate.

4.4.2.2 In METAR and SPECI, observed present weather phenomena shall be reported in terms of type and characteristics and qualified with respect to intensity or proximity to the aerodrome, as appropriate.

4.4.2.3 In local routine reports, local special reports, METAR and SPECI, the following types of present weather phenomena shall be reported, using their respective abbreviations and relevant criteria, as appropriate:

a) Precipitation

Drizzle DZ

Rain	RA
Snow	SN
Snow grains	SG
Ice pellets	PL
Hail — Reported when diameter of largest hailstones is 5 mm or more.	GR
Small hail and/or snow pellets — Reported when diameter of largest hailstones is less than 5 mm.	GS

b) Obscurations (hydrometeors)

Fog — Reported when visibility is less than 1 000 m, except when qualified by "MI", "BC", "PR" or "VC" (see 4.4.2.6 and 4.4.2.8).	FG
Mist — Reported when visibility is at least 1 000 m but not more than 5 000 m.	BR

c) Obscurations (lithometeors)

— The following should be used only when the obscuration consists predominantly of lithometeors and the visibility is 5 000 m or less except "SA" when qualified by "DR" (see 4.4.2.6) and volcanic ash.

Sand	SA
Dust (widespread)	DU
Haze	HZ
Smoke	FU
Volcanic ash	VA

d) Other phenomena

Dust/sand whirls (dust devils)	PO
Squall	SQ
Funnel cloud (tornado or waterspout)	FC
Duststorm	DS
Sandstorm	SS

4.4.2.4 In automated local routine reports, local special reports, METAR and SPECI, in addition to the precipitation types listed under 4.4.2.3 a), the abbreviation UP shall be used for unidentified precipitation when the type of precipitation cannot be identified by the automatic observing system.

4.4.2.5 In local routine reports, local special reports, METAR and SPECI, the following characteristics of present weather phenomena, as necessary, shall be reported, using their respective abbreviations and relevant criteria, as appropriate:

Thunderstorm — Used to report a thunderstorm with precipitation in accordance with the templates shown in the ICAO Annex 3, Appendix 3, Tables A3-1 and A3-2. When thunder is heard or lightning is detected at the aerodrome during the 10-minute period preceding the time of observation but no precipitation is observed at the aerodrome, the abbreviation "TS" shall be used without qualification.	TS
Freezing — Supercooled water droplets or precipitation, used with types of present weather phenomena in accordance with the templates shown in the ICAO Annex 3, Appendix 3, Tables A3-1 and A3-2.	FZ

Note.— At aerodromes with human observers, lightning detection equipment may supplement human observations. For aerodromes with automatic observing systems, guidance on the use of lightning detection equipment intended for thunderstorm

reporting is given in the ICAO Manual on Automatic Meteorological Observing Systems at Aerodromes *(Doc 9837).*

4.4.2.6 In local routine reports, local special reports, METAR and SPECI, the following characteristics of present weather phenomena, as necessary, shall be reported, using their respective abbreviations and relevant criteria, as appropriate:

Shower — Used to report showers in accordance with the templates shown in the ICAO Annex 3, Appendix 3, Tables A3-1 and A3-2. Showers observed in the vicinity of the aerodrome (see 4.4.2.8) shall be reported as "VCSH" without qualification regarding type or intensity of precipitation.	SH
Blowing — Used in accordance with the templates shown in the ICAO Annex 3, Appendix 3, Tables A3-1 and A3-2 with types of present weather phenomena raised by the wind to a height of 2 m (6 ft) or more above the ground.	BL
Low drifting — Used in accordance with the templates shown in Tables A3-1 and A3-2 with types of present weather phenomena raised by the wind to less than 2 m (6 ft) above ground level.	DR
Shallow — Less than 2 m (6 ft) above ground level.	MI
Patches — Fog patches randomly covering the aerodrome.	BC

Partial — A substantial part of the aerodrome covered by fog while the remainder is clear.		PR

4.4.2.7 In automated local routine reports, local special reports, METAR and SPECI, when showers (SH) referred to in 4.4.2.6 cannot be determined based upon a method that takes account of the presence of convective cloud, the precipitation should not be characterized by SH.

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

	(local routine and special reports)	(METAR and SPECI)
Light	FBL	—
Moderate	MOD	(no indication)
Heavy	FVY	+

Used with types of present weather phenomena in accordance with the templates shown in the ICAO Annex 3, Appendix 3, Tables A3-1 and A3-2. Light intensity shall be indicated only for precipitation.

Vicinity — Between approximately 8 and 16 km of the aerodrome reference point and used only in METAR and SPECI with present weather in accordance with the template shown in Table A3-2 when not reported under 4.4.2.5 and 4.4.2.6.	VC

4.4.2.9 In local routine reports, local special reports, METAR and SPECI:

a) one or more, up to a maximum of three, of the present weather abbreviations given in 4.4.2.3 and 4.4.2.4 shall be used, as necessary, together with an indication, where appropriate, of the characteristics given in 4.4.2.5 and 4.4.2.6 and intensity or proximity to the aerodrome given in 4.4.2.8, so as to convey a complete description of the present weather of significance to flight operations;

b) the indication of intensity or proximity, as appropriate, shall be reported first followed respectively by the characteristics and the type of weather phenomena; and

c) where two different types of weather are observed, they shall be reported in two separate groups, where the intensity or proximity indicator refers to the weather phenomenon which follows the indicator. However, different types of precipitation occurring at the time of observation shall be reported as one single group with the dominant type of precipitation reported first and preceded by only one intensity qualifier which refers to the intensity of the total precipitation.

4.4.2.10 In automated local routine reports, local special reports, METAR and SPECI, the present weather should be replaced by "//" when the present weather cannot be observed by the automatic observing system due to a temporary failure of the system/sensor.

4.5 Clouds

4.5.1 Siting

When instrumented systems are used for the measurement of the cloud amount and the height of cloud base, representative observations shall be obtained by the use of sensors appropriately sited. For local routine and special reports, in the case of aerodromes with precision approach runways, sensors for cloud amount and height of cloud base shall be sited to give the best practicable indications of the cloud amount and height of cloud base at the threshold of the runway in use. For that purpose, a sensor shall be installed at a distance of less than 1 200 m (4 000 ft) before the landing threshold.

4.5.2 Display

When automated equipment is used for the measurement of the height of cloud base, height of cloud base display(s) shall be located in the meteorological station with corresponding display(s) in the appropriate ATS units. The displays in the meteorological station and in the ATS units shall relate to the same sensor, and where separate sensors are required as specified in 4.5.1, the displays shall clearly identify the area monitored by each sensor.

4.5.3 Reference level

The height of cloud base shall be reported above aerodrome elevation. When a precision approach runway is in use which has a threshold elevation 15 m (50 ft) or more below the aerodrome elevation, local arrangements shall be made in order that the height of cloud bases reported to arriving aircraft shall refer to the threshold elevation. In the case of reports from offshore structures, the height of cloud base shall be given above mean sea level.

4.5.4. Reporting

4.5.4.1 In local routine reports, local special reports, METAR and SPECI, the height of cloud base shall be reported in steps of 30 m (100 ft) up to 3 000 m (10 000 ft).

4.5.4.2 At aerodromes where low-visibility procedures are established for approach and landing, as agreed between the MET Provider and the ATS Provider, in local routine and special reports the height of cloud base should be reported in steps of 15 m (50 ft) up to and including 90 m (300 ft) and in steps of 30 m (100 ft) between 90 m (300 ft) and 3 000 m (10 000 ft), and the vertical visibility in steps of 15 m (50 ft) up to and including 90 m (300 ft) and in steps of 30 m (100 ft) between 90 m (300 ft) and 600 m (2 000 ft).

4.5.4.3 In local routine reports, local special reports, METAR and SPECI:

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

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

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

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

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

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

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

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

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

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

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

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

4.5.4.4 Any observed value in 4.5.4.1, 4.5.4.2 and 4.5.4.3 c) which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

4.5.4.5 In local routine and special reports:

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

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

4.5.4.6 In automated local routine reports, local special reports, METAR and SPECI:

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

b) when no clouds are detected by the automatic observing system, it shall be indicated by using the abbreviation "NCD";

c) when cumulonimbus clouds or towering cumulus clouds are detected by the automatic observing system and the cloud amount and/or the height of cloud base cannot be observed, the cloud amount and/or the height of cloud base shall be replaced by "///"; and

d) the vertical visibility shall be replaced by "///" when the sky is obscured and the value of the vertical visibility cannot be determined by the automatic observing system due to a temporary failure of the system/sensor.

4.6 Air temperature and dew-point temperature

4.6.1 Display

When automated equipment is used for the measurement of air temperature and dew-point temperature, air temperature and dew-point temperature displays shall be located in the meteorological station with corresponding displays in the appropriate ATS units. The displays in the meteorological station and in the ATS units shall relate to the same sensors.

4.6.2 Reporting

4.6.2.1 In local routine reports, local special reports, METAR and SPECI, the air temperature and the dew-point temperature shall be reported in steps of whole degrees Celsius. Any observed value which does not fit the reporting scale in use shall be rounded to the nearest whole degree Celsius, with observed values involving 0.5° rounded up to the next higher whole degree Celsius.

4.6.2.2 In local routine reports, local special reports, METAR and SPECI, a temperature below 0°C shall be identified.

4.7 Atmospheric pressure

4.7.1 Display

When automated equipment is used for the measurement of atmospheric pressure, QNH and, if required in accordance with 4.7.3.2 b), QFE displays relating to the barometer shall be located in the meteorological station with corresponding displays in the appropriate ATS units. When QFE values are displayed for more than one runway, as specified in 4.7.3.2 d), the displays shall be clearly marked to identify the runway to which the QFE value displayed refers.

4.7.2 Reference level

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

4.7.3 Reporting

4.7.3.1 For local routine reports, local special reports, METAR and SPECI, QNH and QFE shall be computed in tenths of hectopascals and reported therein in steps of whole hectopascals, using four digits. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower whole hectopascal.

4.7.3.2 In local routine and special reports:

a) QNH shall be included;

b) QFE shall be included if required by users or as agreed between the MET Provider, the ATS Provider and the operators concerned, on a regular basis;

c) the units of measurement used for QNH and QFE values shall be included; and

d) if QFE values are required for more than one runway, the required QFE values for each runway shall be reported and the runways to which the values refer shall be indicated.

4.7.3.3 In METAR and SPECI, only QNH values shall be included.

4.8 Supplementary information

4.8.1 Reporting

4.8.1.1 In local routine reports, local special reports, METAR and SPECI, the following recent weather phenomena, i.e. weather phenomena observed at the aerodrome during the period since the last issued routine report or last hour, whichever is the shorter, but not at the time of observation, shall be reported, up to a maximum of three groups, in accordance with the templates shown in Tables A3-1 and A3-2, in the supplementary information:

— freezing precipitation

— moderate or heavy precipitation (including showers thereof)

— blowing snow

— duststorm, sandstorm

— thunderstorm

— funnel cloud (tornado or waterspout)

— volcanic ash

Note.— The MET Provider, in consultation with users, may agree not to provide recent weather information where SPECI are issued.

4.8.1.2 In local routine and special reports, the following significant meteorological conditions, or combinations thereof, should be reported in supplementary information:

— cumulonimbus clouds	CB
— thunderstorm	TS
— moderate or severe turbulence	MOD TURB, SEV TURB
— wind shear	WS
— hail	GR
— severe squall line	SEV SQL
— moderate or severe icing	MOD ICE, SEV ICE
— freezing precipitation	FZDZ, FZRA
— severe mountain waves	SEV MTW
— duststorm, sandstorm	DS, SS
— blowing snow	BLSN
— funnel cloud (tornado or waterspout)	FC

The location of the condition shall be indicated. Where necessary, additional information shall be included using abbreviated plain language.

4.8.1.3 In automated local routine reports, local special reports, METAR and SPECI, in addition to the recent weather phenomena listed under 4.8.1.1, recent unknown precipitation shall be reported in accordance with the template shown in the ICAO Annex 3, Appendix 3, Table A3-2 when the type of precipitation cannot be identified by the automatic observing system.

Note.— The MET Provider, in consultation with users, may agree not to provide recent weather information where SPECI are issued.

4.8.1.4 In METAR and SPECI, where local circumstances so warrant, information on wind shear shall be added.

Note.— The local circumstances referred to in 4.8.1.4 include, but are not necessarily limited to, wind shear of a non-transitory nature such as might be associated with low-level temperature inversions or local topography.

4.8.1.5 METAR and SPECI, information on sea-surface temperature, and the state of the sea or the significant wave height, from aeronautical meteorological stations established on offshore structures in support of helicopter operations shall be included in the supplementary information, in accordance with regional air navigation agreement.

Note.— The state of the sea is specified in the Manual on Codes (WMO-No. 306), Volume I.1, Part A — Alphanumeric Codes, Code Table 3700.

Example A3-1. Routine report

a) Local routine report (same location and weather conditions as METAR):

MET REPORT YUDO 221630Z WIND 240/4MPS VIS 600M RVR RWY 12 TDZ 1000M MOD DZ FG CLD SCT 300M OVC 600M T17 DP16 QNH 1018HPA TREND BECMG TL1700 VIS 800M FG BECMG AT1800 VIS 10KM NSW

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

METAR YUDO 221630Z 24004MPS 0600 R12/1000U DZ FG SCT010 OVC020 17/16 Q1018 BECMG TL1700 0800 FG BECMG AT1800 9999 NSW

Meaning of both reports:

Routine report for Donlon/International* issued on the 22nd of the month at 1630 UTC: surface wind direction 240 degrees; wind speed 4 metres per second; visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) 600 metres; runway visual range representative of the touchdown zone for runway 12 is 1 000 metres and the runway visual range values have shown an upward tendency during previous 10 minutes (runway visual range tendency to be included in METAR only); and moderate drizzle and fog; scattered cloud at 300 metres; overcast at 600 metres; air temperature 17 degrees Celsius; dew-point temperature 16 degrees Celsius; QNH 1 018 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) becoming 800 metres in fog by 1700 UTC; at 1800 UTC visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) becoming 10 kilometres or more and nil significant weather.

* Fictitious location

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

Example A3-2. Special report

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

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

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

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

Meaning of both reports:

Special report for Doulon/International* issued on the 15th of the month at 1115 UTC: surface wind direction 050 degrees; wind speed 25 knots gusting between 10 and 37 knots (minimum wind speed not to be included in SPECI) visibility 1 200 metres (along the runway(s) in the local special report); prevailing visibility 3 000 metres (in SPECI) with minimum visibility 1 200 metres to north east (directional variations to be included in SPECI only); runway visual range above 1 800 metres on runway 05 (runway visual range not required in SPECI with prevailing visibility of 3 000 metres); thunderstorm with heavy rain; broken cumulonimbus cloud at 500 feet; air temperature 25 degrees Celsius; dew-point temperature 22 degrees Celsius; QNH 1 008 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local special report: prevailing visibility in SPECI) temporarily 600 metres from 1115 to 1200, becoming at 1200 UTC visibility (along the runway(s) in the local special report: prevailing visibility in SPECI) 8 kilometres, thunderstorm ceases and nil significant weather and nil significant cloud.

* Fictitious location

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

Example A3-3. Volcanic activity report

VOLCANIC ACTIVITY REPORT YUSB* 231500 MT TROJEEN* VOLCANO N5605 W12652 ERUPTED 231445 LARGE ASH CLOUD EXTENDING TO APPROX 30000 FEET MOVING SW

Meaning:

Volcanic activity report issued by Siby/Bistock meteorological station at 1500 UTC on the 23rd of the month. Mt. Trojeen volcano 56 degrees 5 minutes north 126 degrees 52 minutes west erupted at 1445 UTC on the 23rd; a large ash cloud was observed extending to approximately 30 000 feet and moving in a south-westerly direction.

* Fictitious location

APPENDIX 4 – TECHNICAL SPECIFICATIONS RELATED TO AIRCRAFT OBSERVATIONS AND REPORTS

1. CONTENTS OF AIR-REPORTS

1.1 Routine air-reports by air-ground data link

1.1.1 When air-ground data link is used and automatic dependent surveillance — contract (ADS-C) or SSR Mode S is being applied, the elements contained in routine air-reports shall be:

Message type designator
Aircraft identification

Data block 1
- Latitude
- Longitude
- Level
- Time

Data block 2
- Wind direction
- Wind speed
- Wind quality flag
- Air temperature
- Turbulence (if available)
- Humidity (if available)

Note.— When ADS-C or SSR Mode S is being applied, the requirements of routine air-reports may be met by the combination of the basic ADS-C/SSR Mode S data block (data block 1) and the meteorological information data block (data block 2), available

from ADS-C or SSR Mode S reports. The ADS-C message format is specified in the ICAO PANS-ATM (Doc 4444), 4.11.4 and Chapter 13 and the SSR Mode S message format is specified in the ICAO Annex 10, Volume III, Part I, Chapter 5.

1.1.2 When air-ground data link is used while ADS-C and SSR Mode S are not being applied, the elements contained in routine reports shall be:

Message type designator

Section 1 (Position information)

Aircraft identification
Position or latitude and longitude
Time
Flight level or altitude
Next position and time over
Ensuing significant point

Section 2 (Operational information)

Estimated time of arrival
Endurance

Section 3 (Meteorological information)

Air temperature
Wind direction
Wind speed
Turbulence
Aircraft icing
Humidity (if available)

Note.— When air-ground data link is used while ADS-C and SSR Mode S are not being applied, the requirements of routine air-reports may be met by the controller-pilot data

link communication (CPDLC) application entitled "Position report". The details of this data link application are specified in the ICAO Manual of Air Traffic Services Data Link Applications *(Doc 9694) and in Annex 10, Volume III, Part I.*

1.2 Special air-reports by air-ground data link

When air-ground data link is used, the elements contained in special air-reports shall be:

Message type designator
Aircraft identification

Data block 1
- Latitude
- Longitude
- Level
- Time

Data block 2
- Wind direction
- Wind speed
- Wind quality flag
- Air temperature
- Turbulence (if available)
- Humidity (if available)

Data block 3

Condition prompting the issuance of a special air-report (one condition to be selected from the list presented in

Table A4-1).

Note 1.— The requirements of special air-reports may be met by the data link flight information service (D-FIS) application entitled "Special air-report service". The details of this data link application are specified in ICAO Doc 9694.

Note 2.— In the case of a special air-report of pre-eruption volcanic activity, volcanic eruption or volcanic ash cloud, additional requirements are indicated in 4.2.

1.3 Special air-reports by voice communications

When voice communications are used, the elements contained in special air-reports shall be:

Message type designator

Section 1 (Position information)

Aircraft identification

Position or latitude and longitude

Time

Level or range of levels

Section 3 (Meteorological information)

Condition prompting the issuance of a special air-report, to be selected from the list presented in Table A4-1.

Note 1.— Air-reports are considered routine by default. The message type designator for special air-reports is specified in the ICAO PANS-ATM (Doc 4444), Appendix 1.

Note 2.— In the case of a special air-report of pre-eruption volcanic activity, volcanic eruption or volcanic ash cloud, additional requirements are indicated in 4.2.

2. CRITERIA FOR REPORTING

2.1 General

When air-ground data link is used, the wind direction, wind speed, wind quality flag, air temperature, turbulence and humidity included in air-reports shall be reported in accordance with the following criteria.

2.2 Wind direction

The wind direction shall be reported in terms of degrees true, rounded to the nearest whole degree.

2.3 Wind speed

The wind speed shall be reported in metres per second or knots, rounded to the nearest 1 m/s (1 knot). The units of measurement used for the wind speed shall be indicated.

2.4 Wind quality flag

The wind quality flag shall be reported as 0 when the roll angle is less than 5 degrees and as 1 when the roll angle is 5 degrees or more.

2.5 Air temperature

The air temperature shall be reported to the nearest tenth of a degree Celsius.

2.6 Turbulence

The turbulence shall be reported in terms of the cube root of the eddy dissipation rate (EDR).

Note.— The EDR is an aircraft-independent measure of turbulence. However, the relationship between the EDR value and the perception of turbulence is a function of aircraft type, and the mass, altitude, configuration and airspeed of the aircraft. The EDR values given below describe the severity levels for a medium-sized transport aircraft under typical en-route conditions (i.e. altitude, airspeed and weight).

2.6.1 Routine air-reports

The turbulence shall be reported during the en-route phase of the flight and shall refer to the 15-minute period immediately preceding the observation. Both the average and peak value of turbulence, together with the time of occurrence of the peak value to the nearest minute, shall be observed. The average and peak values shall be reported in terms of EDR. The time of occurrence of the peak value shall be reported as indicated in the ICAO Annex 3, Appendix, 4, Table A4-2. The turbulence shall be reported during the climbout phase for the first 10 minutes of the flight and shall refer to the 30-second period immediately preceding the observation. The peak value of turbulence shall be observed.

2.6.2 Interpretation of the turbulence report

Turbulence shall be considered:

a) severe when the peak value of EDR equals or exceeds 0.45;

b) moderate when the peak value of EDR is equal to or above 0.20 and below 0.45;

c) light when the peak value of EDR is above 0.10 and below 0.20; and

d) nil when the peak value of EDR is below or equal to 0.10.

2.6.3 Special air-reports

Special air-reports on turbulence shall be made during any phase of the flight whenever the peak value of EDR equals or exceeds 0.20. The special air-report on turbulence shall be made with reference to the 1-minute period immediately preceding the observation. Both the average and peak value of turbulence shall be observed. The average and peak values shall be reported in

terms of EDR. Special air-reports shall be issued every minute until such time as the peak values of EDR fall below 0.20.

2.7 Humidity

The humidity shall be reported as the relative humidity, rounded to the nearest whole per cent.

Note.— The ranges and resolutions for the meteorological elements included in air-reports are shown in the ICAO Annex 3, Appendix 4, Table A4-3.

3. EXCHANGE OF AIR-REPORTS

3.1 Responsibilities of the meteorological watch offices

3.1.1 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.

3.1.2 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.

3.1.3 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 messages are disseminated in accordance with Appendix 6, 1.2.1, 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 ICAO Annex 3, Appendix 6, Table A6-1B.

3.2 Responsibilities of world area forecast centres

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 WMO Global Telecommunication System.

3.3 Supplementary dissemination of air-reports

Where supplementary dissemination of air-reports is required to satisfy special aeronautical or meteorological requirements, such dissemination should be arranged and agreed between the meteorological authorities concerned.

3.4 Format of air-reports

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

4. SPECIFIC PROVISIONS RELATED TO REPORTING WIND SHEAR AND VOLCANIC ASH

4.1 Reporting of wind shear

4.1.1 When reporting aircraft observations of wind shear encountered during the climb-out and approach phases of flight, the aircraft type shall be included.

4.1.2 Where wind shear conditions in the climb-out or approach phases of flight were reported or forecast but not encountered, the pilot-in-command shall advise the

appropriate ATS unit as soon as practicable unless the pilot-in-command is aware that the appropriate ATS unit has already been so advised by a preceding aircraft.

4.2 Post-flight reporting of volcanic activity

4.2.1 On arrival of a flight at an aerodrome, the completed report of volcanic activity shall be delivered by the operator or a flight crew member, without delay, to the aerodrome meteorological office, or if such office is not easily accessible to arriving flight crew members, the completed form shall be dealt with in accordance with local arrangements made by the meteorological authority and the operator.

4.2.2 The completed report of volcanic activity received by an aerodrome meteorological office shall be transmitted without delay to the meteorological watch office responsible for the provision of meteorological watch for the flight information region in which the volcanic activity was observed.

APPENDIX 5 – TECHNICAL SPECIFICATIONS RELATED TO FORECASTS

1. CRITERIA RELATED TO TAF

1.1 TAF format

1.1.1 TAF shall be issued in accordance with the template shown in the ICAO Annex 3, Appendix 5, Table A5-1 and disseminated in the TAF code form prescribed by the World Meteorological Organization (WMO).

Note.— The TAF code form is contained in the Manual on Codes *(WMO-No. 306), Volume I.1, Part A* — Alphanumeric Codes.

1.1.2 TAF shall be disseminated in IWXXM GML form in addition to the dissemination of the TAF in accordance with 1.1.1.

Note 1.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D* — Representation Derived from Data Models. *Guidance on the implementation of IWXXM is provided in* Manual on the ICAO Meteorological Information Exchange Model (IWXXM) *(Doc 10003).*

Note 2. — Geography markup language (GML) is an encoding standard of the Open Geospatial Consortium (OGC).

1.2 Inclusion of meteorological elements in TAF

1.2.1 Surface wind

In forecasting surface wind, the expected prevailing direction shall be given. When it is not possible to forecast a prevailing surface wind direction due to its expected variability, for example, during light wind conditions (less than 1.5 m/s (3 kt)) or thunderstorms, the forecast

wind direction shall be indicated as variable using "VRB". When the wind is forecast to be less than 0.5 m/s (1 kt), the forecast wind speed shall be indicated as calm. When the forecast maximum speed (gust) exceeds the forecast mean wind speed by 5 m/s (10 kt) or more, the forecast maximum wind speed shall be indicated. When a wind speed of 50 m/s (100 kt) or more is forecast, it shall be indicated to be more than 49 m/s (99 kt).

1.2.2 Visibility

When the visibility is forecast to be less than 800 m, it shall be expressed in steps of 50 m; when it is forecast to be 800 m or more but less than 5 km, in steps of 100 m; 5 km or more but less than 10 km, in kilometre steps; and when it is forecast to be 10 km or more, it shall be expressed as 10 km, except when conditions of CAVOK are forecast to apply. The prevailing visibility shall be forecast. When visibility is forecast to vary in different directions and the prevailing visibility cannot be forecast, the lowest forecast visibility shall be given.

1.2.3 Weather phenomena

One or more, up to a maximum of three, of the following weather phenomena or combinations thereof, together with their characteristics and, where appropriate, intensity, shall be forecast if they are expected to occur at the aerodrome:

— freezing precipitation
— freezing fog
— moderate or heavy precipitation (including showers thereof)
— low drifting dust, sand or snow
— blowing dust, sand or snow
— duststorm
— sandstorm
— thunderstorm (with or without precipitation)
— squall
— funnel cloud (tornado or waterspout)

— other weather phenomena given in Appendix 3, 4.4.2.3, as agreed between the MET Provider, the ATS Provider and the operators concerned.

The expected end of occurrence of those phenomena shall be indicated by the abbreviation "NSW".

1.2.4 Cloud

Cloud amount shall be forecast using the abbreviations "FEW", "SCT", "BKN" or "OVC" as necessary. When it is expected that the sky will remain or become obscured and clouds cannot be forecast and information on vertical visibility is available at the aerodrome, the vertical visibility shall be forecast in the form "VV" followed by the forecast value of the vertical visibility. When several layers or masses of cloud are forecast, their amount and height of base shall be included in the following order:

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

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

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

d) cumulonimbus clouds and/or towering cumulus clouds, whenever forecast and not already included under a) to c).

Cloud information shall be limited to cloud of operational significance; when no cloud of operational significance is forecast, and "CAVOK" is not appropriate, the abbreviation "NSC" shall be used.

1.2.5 Temperature

When forecast temperatures are included in accordance with regional air navigation agreement, the maximum and minimum temperatures expected to occur during the period of validity of the TAF shall be given, together with their corresponding times of occurrence.

1.3 Use of change groups

Note. — Guidance on the use of change and time indicators in TAF is given in the ICAO Annex 3, Appendix 5, Table A5-2.

1.3.1 The criteria used for the inclusion of change groups in TAF or for the amendment of TAF shall be based on any of the following weather phenomena or combinations thereof being forecast to begin or end or change in intensity:

— freezing fog

— freezing precipitation

— moderate or heavy precipitation (including showers)

— thunderstorm

— duststorm

— sandstorm.

1.3.2 The criteria used for the inclusion of change groups in TAF or for the amendment of TAF shall be based on the following:

a) when the mean surface wind direction is forecast to change by 60° or more, the mean speed before and/or after the change being 5 m/s (10 kt) or more;

b) when the mean surface wind speed is forecast to change by 5 m/s (10 kt) or more;

c) when the variation from the mean surface wind speed (gusts) is forecast to change by 5 m/s (10 kt) or more, the mean speed before and/or after the change being 7.5 m/s (15 kt) or more;

d) when the surface wind is forecast to change through values of operational significance. The threshold values shall be established by the MET Provider in consultation with the ATS Provider and the operators concerned, taking into account changes in the wind which would:

1) require a change in runway(s) in use; and

2) indicate that the runway tailwind and crosswind components will change through values representing the main operating limits for typical aircraft operating at the aerodrome;

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

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

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

f) when any of the following weather phenomena or combinations thereof are forecast to begin or end:

— low drifting dust, sand or snow

— blowing dust, sand or snow

— squall

— funnel cloud (tornado or waterspout);

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

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

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

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

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

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

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

j) any other criteria based on local aerodrome operating minima, as agreed between the MET Provider and the operators concerned.

Note.— Other criteria based on local aerodrome operating minima are to be considered in parallel with similar criteria for the issuance of SPECI developed in response to Appendix 3, 2.3.3 h).

1.3.3 When a change in any of the elements given in Chapter 5, 5.2.3 is required to be indicated in accordance with the criteria given in 1.3.2, the change indicators "BECMG" or "TEMPO" shall be used followed by the time period during which the change is expected to occur. The time period shall be indicated as the beginning and end of the period in whole hours UTC. Only those elements for which a significant change is expected shall be included following a change indicator. However, in the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change, shall be indicated.

1.3.4 The change indicator "BECMG" and the associated time group shall be used to describe changes where the meteorological conditions are expected to reach or pass through specified threshold values at a regular or irregular rate and at an unspecified time during the time period. The time period shall normally not exceed 2 hours but in any case, shall not exceed 4 hours.

1.3.5 The change indicator "TEMPO" and the associated time group shall be used to describe expected frequent or infrequent temporary fluctuations in the meteorological conditions which reach or pass specified threshold values and last for a period of less than one hour in each instance and, in the aggregate, cover less than one-half of the forecast period during which the fluctuations are expected to occur. If the temporary fluctuation is expected to last one hour or longer, the change group "BECMG" shall be used in accordance with 1.3.4 or the validity period shall be subdivided in accordance with 1.3.6.

1.3.6 Where one set of prevailing weather conditions is expected to change significantly and more or less completely to a different set of conditions, the period of validity shall be subdivided into self-contained periods using the abbreviation "FM" followed immediately by a six-figure time group in days, hours and minutes UTC indicating the time the change is expected to occur. The subdivided period following the abbreviation "FM" shall be self-contained and all forecast conditions given before the abbreviation shall be superseded by those following the abbreviation.

1.4 Use of probability groups

The probability of occurrence of an alternative value of a forecast element or elements shall be indicated, as necessary, by use of the abbreviation "PROB" followed by the probability in tens of per cent and the time period during which the alternative value(s) is (are) expected to apply. The probability information shall be placed after the element or elements forecast and be followed by the alternative value of the element or elements. The probability of a forecast of temporary fluctuations in meteorological conditions shall be indicated, as necessary, by use of the abbreviation "PROB" followed by the probability in tens of per cent, placed before the change indicator "TEMPO" and associated time group. A probability of an alternative value or change of less than 30 per cent shall not be considered sufficiently significant to be indicated. A probability of an alternative value or change of 50 per cent or more, for aviation purposes, shall not be considered a probability but instead shall be indicated, as necessary, by use of the change indicators "BECMG" or "TEMPO" or by subdivision of the validity period using the abbreviation "FM". The probability group shall not be used to qualify the change indicator "BECMG" nor the time indicator "FM".

1.5 Numbers of change and probability groups

The number of change and probability groups shall be kept to a minimum and shall not normally exceed five groups.

1.6 Dissemination of TAF

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.

2. CRITERIA RELATED TO TREND FORECASTS

2.1 Format of trend forecasts

Trend forecasts shall be issued in accordance with the templates shown in the ICAO Annex 3, Appendix 3, Tables A3-1 and A3-2. The units and scales used in the trend forecast shall be the same as those used in the report to which it is appended.

Note.— Examples of trend forecasts are given in Appendix 3.

2.2 Inclusion of meteorological elements in trend forecasts

2.2.1 General provisions

The trend forecast shall indicate significant changes in respect of one or more of the elements: surface wind, visibility, weather and clouds. Only those elements shall be included for which a significant change is expected. However, in the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change, shall be indicated. In the case of a significant change in visibility, the phenomenon causing the reduction of visibility shall also be indicated. When no change is expected to occur, this shall be indicated by the term "NOSIG".

2.2.2 Surface wind

The trend forecast shall indicate changes in the surface wind which involve:

a) a change in the mean wind direction of 60° or more, the mean speed before and/or after the change being 5 m/s (10 kt) or more;

b) a change in mean wind speed of 5 m/s (10 kt) or more; and

c) changes in the wind through values of operational significance. The threshold values shall be established by the MET Provider in consultation with the ATS Provider and the operators concerned, taking into account changes in the wind which would:

1) require a change in runway(s) in use; and

2) indicate that the runway tailwind and crosswind components will change through values representing the main operating limits of typical aircraft operating at the aerodrome.

2.2.3 Visibility

When the visibility is expected to improve and change to or pass through one or more of the following values, or when the visibility is expected to deteriorate and pass through one or more of the following values: 150, 350, 600, 800, 1 500 or 3 000 m, the trend forecast shall indicate the change. When significant numbers of flights are conducted in accordance with the visual flight rules, the forecast shall additionally indicate changes to or passing through 5 000 m.

Note.— In trend forecasts appended to local routine and special reports, visibility refers to the forecast visibility along the runway(s); in trend forecasts appended to METAR and SPECI, visibility refers to the forecast prevailing visibility.

2.2.4

2.2.4.1 The trend forecast shall indicate the expected onset, cessation or change in intensity of one or more of the

following weather phenomena or combinations thereof:

— freezing precipitation

— moderate or heavy precipitation (including showers)

— thunderstorm (with precipitation)

— duststorm

— sandstorm

— other weather phenomena given in Appendix 3, 4.4.2.3, as agreed between the MET Provider, the ATS Provider and the operators concerned.

2.2.4.2 The trend forecast shall indicate the expected onset or cessation of one or more of the following weather phenomena or combinations thereof:

— freezing fog

— low drifting dust, sand or snow

— blowing dust, sand or snow

— thunderstorm (without precipitation)

— squall

— funnel cloud (tornado or waterspout).

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

2.2.4.4 The expected end of occurrence of the weather phenomena shall be indicated by the abbreviation "NSW".

2.2.5 Clouds

When the height of the base of a cloud layer of BKN or OVC extent is expected to lift and change to or pass through one or more of the following values, or when the height of the base of a cloud layer of BKN or OVC extent is expected to lower and pass through one or more of the following values: 30, 60, 150, 300 and 450 m (100, 200, 500, 1 000 and 1 500 ft), the trend forecast shall indicate the change. When the height of the base of a cloud layer is below or is expected to fall below or rise above 450 m (1 500 ft), the trend forecast shall also indicate changes in cloud amount from FEW, or SCT increasing to BKN or OVC, or changes from BKN or OVC decreasing to FEW or SCT. When no clouds of operational significance are forecast and "CAVOK" is not appropriate, the abbreviation "NSC" shall be used.

2.2.6 Vertical visibility

When the sky is expected to remain or become obscured and vertical visibility observations are available at the aerodrome, and the vertical visibility is forecast to improve and change to or pass through one or more of the following values, or when the vertical visibility is forecast to deteriorate and pass through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft), the trend forecast shall indicate the change.

2.2.7 Additional criteria

Criteria for the indication of changes based on local aerodrome operating minima, additional to those specified in 2.2.2 to 2.2.6, shall be used as agreed between the MET Provider and the operator concerned.

2.3 Use of change groups

2.3.1 When a change is expected to occur, the trend forecast shall begin with one of the change indicators "BECMG" or "TEMPO".

2.3.2 The change indicator "BECMG" shall be used to describe forecast changes where the meteorological conditions are expected to reach or pass through specified values at a regular or irregular rate. The period during which, or the time at which, the change is forecast to occur shall be indicated, using the abbreviations "FM", "TL" or "AT", as appropriate, each followed by a time group in hours and minutes. When the change is forecast to begin and end wholly within the trend forecast period, the beginning and end of the change shall be indicated by using the abbreviations "FM" and "TL", respectively, with their associated time groups. When the change is forecast to commence at the beginning of the trend forecast period but be completed before the end of that period, the abbreviation "FM" and its associated time group shall be omitted and only "TL" and its associated time group shall be used. When the change is forecast to begin during the trend forecast period and be completed at the end of that period, the

abbreviation "TL" and its associated time group shall be omitted and only "FM" and its associated time group shall be used. When the change is forecast to occur at a specified time during the trend forecast period, the abbreviation "AT" followed by its associated time group shall be used. When the change is forecast to commence at the beginning of the trend forecast period and be completed by the end of that period or when the change is forecast to occur within the trend forecast period but the time is uncertain, the abbreviations "FM", "TL" or "AT" and their associated time groups shall be omitted and the change indicator "BECMG" shall be used alone.

2.3.3 The change indicator "TEMPO" shall be used to describe forecast temporary fluctuations in the meteorological conditions which reach or pass specified values and last for a period of less than one hour in each instance and, in the aggregate, cover less than one-half of the period during which the fluctuations are forecast to occur. The period during which the temporary fluctuations are forecast to occur shall be indicated, using the abbreviations "FM" and/or "TL", as appropriate, each followed by a time group in hours and minutes. When the period of temporary fluctuations in the meteorological conditions is forecast to begin and end wholly within the trend forecast period, the beginning and end of the period of temporary fluctuations shall be indicated by using the abbreviations "FM" and "TL", respectively, with their associated time groups. When the period of temporary fluctuations is forecast to commence at the beginning of the trend forecast period but cease before the end of that period, the abbreviation "FM" and its associated time group shall be omitted and only "TL" and its associated time group shall be used. When the period of temporary fluctuations is forecast to begin during the trend forecast period and cease by the end of that period, the abbreviation "TL" and its associated time group shall be omitted and only "FM" and its associated time group shall be used. When the period of temporary fluctuations is forecast to commence at the beginning of the trend forecast period and cease by the end of that period, both abbreviations "FM" and "TL" and their associated time groups shall be omitted and the change indicator "TEMPO" shall be used alone.

2.4 Use of the probability indicator

The indicator "PROB" shall not be used in trend forecasts.

3. CRITERIA RELATED TO FORECASTS FOR TAKE-OFF

3.1 Format of forecasts for take-off

The format of the forecast should be as agreed between the MET Provider and the operator concerned. The order of the elements and the terminology, units and scales used in forecasts for take-off should be the same as those used in reports for the same aerodrome.

3.2 Amendments to forecasts for take-off

The criteria for the issuance of amendments to forecasts for take-off for surface wind direction and speed, temperature and pressure and any other elements agreed locally should be agreed between the MET Provider and the operators concerned. The criteria should be consistent with the corresponding criteria for special reports established for the aerodrome in accordance with Appendix 3, 2.3.1.

4. CRITERIA RELATED TO AREA FORECASTS FOR LOW-LEVEL FLIGHTS

4.1 Format and content of GAMET area forecasts

When prepared in GAMET format, area forecasts shall contain two sections: Section I related to information on en-route weather phenomena hazardous to low-level flights, prepared in support of the issuance of AIRMET information, and Section II related to additional information required by low-level flights. The content and order of elements in a GAMET area forecast, when prepared, shall be in accordance with the template shown in Table A5-3. Additional elements in Section II shall be included in accordance with regional air navigation agreement. Elements which are already covered by a SIGMET message shall be omitted from GAMET area forecasts.

4.2 Amendments to GAMET area forecasts

When a weather phenomenon hazardous to low-level flights has been included in the GAMET area forecast and the phenomenon forecast does not occur, or is no longer forecast, a GAMET AMD shall be issued, amending only the weather element concerned.

Note.— Specifications regarding the issuance of AIRMET information amending the area forecast in respect of weather phenomena hazardous for low-level flights are given in Appendix 6.

4.3 Content of area forecasts for low-level flights in chart form

4.3.1 When chart form is used for area forecasts for low-level flights, the forecast of upper wind and upper-air temperature shall be issued for points separated by no more than 500 km (300 NM) and for at least the following altitudes: 600, 1 500 and 3 000 m (2 000, 5 000 and 10 000 ft), and 4 500 m (15 000 ft) in mountainous areas.

4.3.2 When chart form is used for area forecasts for low-level flights, the forecast of SIGWX phenomena shall be issued as low-level SIGWX forecast for flight levels up to 100 (or up to flight level 150 in mountainous areas, or higher, where necessary). Low-level SIGWX forecasts shall include the following items:

a) the phenomena warranting the issuance of a SIGMET as given in Appendix 6 and which are expected to affect low-level flights; and

b) the elements in area forecasts for low-level flights as given in Table A5-3 except elements concerning:

1) upper wind and upper-air temperature; and

2) forecast QNH.

Note.— Guidance on the use of terms "ISOL", "OCNL" and "FRQ" referring to cumulonimbus and towering cumulus clouds, and thunderstorms is given in Appendix 6.

4.4 Exchange and dissemination of area forecasts for low-level flights

4.4.1 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.

4.4.2 Area forecasts for low-level flights, in support of international air navigation, prepared in accordance with regional air navigation agreement and in support of the issuance of AIRMET information shall be disseminated to the aeronautical fixed service Internet-based services.

Example A5-1. TAF

TAF for YUDO (Donlon/International):*

TAF YUDO 151800Z 1600/1618 13005MPS 9000 BKN020 BECMG 1606/1608 SCT015CB BKN020 TEMPO 1608/1612 17006G12MPS 1000 TSRA SCT010CB BKN020 FM161230 15004MPS 9999 BKN020

Meaning of the forecast:

TAF for Donlon/International* issued on the 15th of the month at 1800 UTC valid from 0000 UTC to 1800 UTC on the 16th of the month: surface wind direction 130 degrees; wind speed 5 metres per second; visibility 9 kilometres, broken cloud at 600 metres; becoming between 0600 UTC and 0800 UTC on the 16th of the month, scattered cumulonimbus cloud at 450 metres and broken cloud at 600 metres: temporarily between 0800 UTC and 1200 UTC on the 16th of the month surface wind direction 170 degrees; wind speed 6 metres per second gusting to 12 metres per second: visibility 1 000 metres in a thunderstorm with moderate rain, scattered cumulonimbus cloud at 300 metres and broken cloud at 600 metres; from 1230 UTC on the 16th of the month surface wind direction 150 degrees; wind speed 4 metres per second; visibility 10 kilometres or more; and broken cloud at 600 metres.

* Fictitious location

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

Example A5-2. Cancellation of TAF

Cancellation of TAF for YUDO (Donlon/International):*

TAF AMD YUDO 161500Z 1600/1618 CNL

Meaning of the forecast:

Amended TAF for Donlon/International* issued on the 16th of the month at 1500 UTC cancelling the previously issued TAF valid from 0000 UTC to 1800 UTC on the 16th of the month.

* Fictitious location

Example A5-3. GAMET area forecast

YUCC GAMET VALID 220600/221200 YUDO –
YUCC AMSWELL FIR/2 BLW FL120
SECN I

SFC WIND:	10/12 310/16MPS
SFC VIS:	06/08 N OF N51 3000M BR
SIGWX:	11/12 ISOL TS
SIG CLD:	06/09 N OF N51 OVC 800/1100FT AGL 10/12 ISOL TCU 1200/8000FT AGL
ICE:	MOD FL050/080
TURB:	MOD ABV FL090
SIGMET APPLICABLE:	3, 5
SECN II	
PSYS:	06 N5130 E01000 L 1004HPA MOV NE 25KT WKN
WIND/T:	2000FT N5500 W01000 270/18MPS PS03 5000FT N5500 W01000 250/20MPS MS02 10000FT N5500 W01000 240/22MPS MS11
CLD:	BKN SC 2500/8000FT AGL
FZLVL:	3000FT AGL
MNM QNH:	1004HPA
SEA:	T15 HGT 5M
VA:	NIL

Meaning: An area forecast for low-level flights (GAMET) issued for sub-area two of the Amswell* flight information region (identified by YUCC Amswell area control centre) for below flight level 120 by the Donlon/International* aerodrome meteorological office (YUDO); the message is valid from 0600 UTC to 1200 UTC on the 22nd of the month.

Section I:

surface wind speed and direction:	between 1000 UTC and 1200 UTC surface wind direction 310 degrees; wind speed 16 metres per second;
surface visibility:	between 0600 UTC and 0800 UTC north of 51 degrees north 3 000 metres (due to mist);
significant weather phenomena:	between 1100 UTC and 1200 UTC isolated thunderstorms without hail;
significant clouds:	between 0600 UTC and 0900 UTC north of 51 degrees north overcast base 800, top 1 100 feet above ground level; between 1000 UTC and 1200 UTC isolated towering cumulus base 1 200, top 8 000 feet above ground level;
icing:	moderate between flight level 050 and 080;
turbulence:	moderate above flight level 090 (at least up to flight level 120);
SIGMET messages:	3 and 5 applicable to the validity period and sub-area concerned.

Section II:

pressure systems:	at 0600 UTC low pressure of 1 004 hectopascals at 51.5 degrees north 10.0 degrees east, expected to move north-eastwards at 25 knots and to weaken;
winds and temperatures:	at 2 000 feet above ground level at 55 degrees north 10 degrees west wind direction 270 degrees, wind speed 18 metres per second, temperature plus 3 degrees Celsius; at 5 000 feet above ground level at 55 degrees north 10 degrees west wind direction 250 degrees, wind speed 20 metres per second, temperature minus 2 degrees Celsius; at 10 000 feet above ground level at 55 degrees north 10 degrees west wind direction 240 degrees, wind speed 22 metres per second, temperature minus 11 degrees Celsius;
clouds:	broken stratocumulus, base 2 500 feet, top 8 000 feet above ground level;
freezing level:	3 000 feet above ground level;
minimum QNH:	1 004 hectopascals;
sea:	surface temperature 15 degrees Celsius; and state of the sea 5 metres;
volcanic ash:	nil.

* Fictitious location

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

1. SPECIFICATIONS RELATED TO SIGMET INFORMATION

1.1 Format of SIGMET messages

1.1.1 The content and order of elements in a SIGMET message shall be in accordance with the template shown in the ICAO Annex 3, Appendix 6, Table A6-1A.

1.1.2 Messages containing SIGMET information shall be identified as: "SIGMET".

1.1.3 The sequence number referred to in the template in the ICAO Annex 3, Appendix 6, Table A6-1A shall correspond with the number of SIGMET messages issued for the flight information region (FIR) since 0001 UTC on the day concerned. The meteorological watch offices whose area of responsibility encompasses more than one FIR and/or control area (CTA) shall issue separate SIGMET messages for each FIR and/or CTA within their area of responsibility.

1.1.4 In accordance with the template in the ICAO Annex 3, Appendix 6, Table A6-1A, only one of the following phenomena shall be included in a SIGMET message, using the abbreviations as indicated below:

At cruising levels (irrespective of altitude):

thunderstorm	
— obscured	OBSC TS
— embedded	EMBD TS
— frequent	FRQ TS
— squall line	SQL TS

— obscured with hail	OBSC TSGR
— embedded with hail	EMBD TSGR
— frequent, with hail	FRQ TSGR
— squall line with hail	SQL TSGR
tropical cyclone	
— tropical cyclone with 10-minute mean surface wind speed of 17 m/s (34 kt) or more	TC (+ cyclone name)
turbulence	
— severe turbulence	SEV TURB
icing	
— severe icing	SEV ICE
— severe icing due to freezing rain	SEV ICE (FZRA)
mountain wave	
— severe mountain wave	SEV MTW
duststorm	
— heavy duststorm	HVY DS
sandstorm	
— heavy sandstorm	HVY SS
volcanic ash	
— volcanic ash	VA (+ volcano name, if known)
radioactive cloud	RDOACT CLD

1.1.5 SIGMET information shall not contain unnecessary descriptive material. In describing the weather phenomena for which the SIGMET is issued, no descriptive material additional to that given in 1.1.4 shall be included. SIGMET information concerning thunderstorms or a tropical cyclone shall not include references to associated turbulence and icing.

1.1.6 SIGMET information shall be disseminated in IWXXM GML form in addition to the dissemination of SIGMET information in accordance with 1.1.1.

Note 1.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D* — Representation Derived from Data Models. *Guidance on the implementation of IWXXM is provided in* Manual on the ICAO Meteorological Information Exchange Model (IWXXM) *(Doc 10003).*

Note 2. — Geography markup language (GML) is an encoding standard of the Open Geospatial Consortium (OGC).

1.1.7 SIGMET, when issued in graphical format, shall be as specified in Appendix 1, including the use of applicable symbols and/or abbreviations.

1.2 Dissemination of SIGMET messages

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

1.2.2 SIGMET messages 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.

2. SPECIFICATIONS RELATED TO AIRMET INFORMATION

2.1 Format of AIRMET messages

2.1.1 The content and order of elements in an AIRMET message shall be in accordance with the template shown in the ICAO Annex 3, Appendix 6, Table A6-1A.

2.1.2 The sequence number referred to in the template in the ICAO Annex 3, Appendix 6, Table A6-1A shall correspond with the number of AIRMET messages issued for the FIR since 0001 UTC on the day concerned. The meteorological watch offices whose area of responsibility encompasses more than one FIR and/or CTA shall issue separate AIRMET messages for each FIR and/or CTA within their area of responsibility.

2.1.3 The FIR shall be divided in sub-areas, as necessary.

2.1.4 In accordance with the template in Table A6-1A, only one of the following phenomena shall be included in an AIRMET message, using the abbreviations as indicated below:

At cruising levels below flight level 100 (or below flight level 150 in mountainous areas, or higher, where necessary):

— surface wind speed	
– widespread mean surface wind speed above 15 m/s (30 kt)	SFC WIND (+ wind, direction, speed and units)
— surface visibility	
– widespread areas affected by reduction of visibility to less than 5 000 m, including the weather	SFC VIS (+ visibility) (+ one of the following weather phenomena or combinations thereof: BR, DS, DU, DZ,

phenomenon causing the reduction of visibility	FC, FG, FU, GR, GS, HZ, PL, PO, RA, SA, SG, SN, SQ, SS or VA)
— thunderstorms	
– isolated thunderstorms without hail	ISOL TS
– occasional thunderstorms without hail	OCNL TS
– isolated thunderstorms with hail	ISOL TSGR
– occasional thunderstorms with hail	OCNL TSGR
— mountain obscuration	
– mountains obscured	MT OBSC
— cloud	
– widespread areas of broken or overcast cloud with height of base less than 300 m (1 000 ft) above ground level:	
– broken	BKN CLD (+ height of the base and top and units)
– overcast	OVC CLD (+ height of the base and top and units)
– cumulonimbus clouds which are:	
– isolated	ISOL CB
– occasional	OCNL CB
– frequent	FRQ CB

– towering cumulus clouds which are:

– isolated	ISOL TCU
– occasional	OCNL TCU
– frequent	FRQ TCU

— icing

– moderate icing (except for icing in convective clouds)	MOD ICE

— turbulence

– moderate turbulence (except for turbulence in convective clouds)	MOD TURB

— mountain wave

– moderate mountain wave	MOD MTW

2.1.5 AIRMET information shall not contain unnecessary descriptive material. In describing the weather phenomena for which the AIRMET is issued, no descriptive material additional to that given in 2.1.4 shall be included. AIRMET information concerning thunderstorms or cumulonimbus clouds shall not include references to associated turbulence and icing.

Note.— The specifications for SIGMET information which is also applicable to low-level flights are given in 1.1.4.

2.1.6 AIRMET information shall be disseminated in IWXXM GML form in addition to the dissemination of AIRMET information in accordance with 2.1.1.

Note 1.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D* — Representation Derived from Data Models. *Guidance on the implementation of IWXXM is provided in* Manual on the ICAO Meteorological Information Exchange Model (IWXXM) *(Doc 10003).*

Note 2. — Geography markup language (GML) is an encoding standard of the Open Geospatial Consortium (OGC).

2.2 Dissemination of AIRMET messages

2.2.1 AIRMET messages shall 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.

2.2.2 AIRMET messages shall 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.

3. SPECIFICATIONS RELATED TO SPECIAL AIR-REPORTS

3.1 Special air-reports shall be uplinked for 60 minutes after their issuance.

3.2 Information on wind and temperature included in automated special air-reports shall not be uplinked to other aircraft in flight.

4. DETAILED CRITERIA RELATED TO SIGMET AND AIRMET MESSAGES AND SPECIAL AIR-REPORTS (UPLINK)

4.1 Identification of the flight information region

In cases where the airspace is divided into an FIR and an upper flight information region (UIR), the SIGMET shall be identified by the location indicator of the ATS unit serving the FIR.

Note.— The SIGMET message 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 causing the issuance of the SIGMET are given in the text of the message.

4.2 Criteria related to phenomena included in SIGMET and AIRMET messages and special air-reports (uplink)

4.2.1 An area of thunderstorms and cumulonimbus clouds shall be considered:

a) obscured (OBSC) if it is obscured by haze or smoke or cannot be readily seen due to darkness;

b) embedded (EMBD) if it is embedded within cloud layers and cannot be readily recognized;

c) isolated (ISOL) if it consists of individual features which affect, or are forecast to affect, an area with a maximum spatial coverage less than 50 per cent of the area concerned (at a fixed time or during the period of validity); and

d) occasional (OCNL) if it consists of well-separated features which affect, or are forecast to affect, an area with a maximum spatial coverage between 50 and 75 per cent of the area concerned (at a fixed time or during the period of validity).

4.2.2 An area of thunderstorms shall be considered frequent (FRQ) if within that area there is little or no separation between adjacent thunderstorms with a maximum spatial coverage greater than 75 per cent of the area affected, or forecast to be affected, by the phenomenon (at a fixed time or during the period of validity).

4.2.3 Squall line (SQL) shall indicate a thunderstorm along a line with little or no space between individual clouds.

4.2.4 Hail (GR) shall be used as a further description of the thunderstorm, as necessary.

4.2.5 Severe and moderate turbulence (TURB) shall refer only to: low-level turbulence associated with strong surface winds; rotor streaming; or turbulence whether in cloud or not in cloud (CAT). Turbulence shall not be used in connection with convective clouds.

4.2.6 Turbulence shall be considered:

a) severe when the peak value of EDR equals or exceeds 0.45; and

b) moderate when the peak value of EDR is equal to or above 0.20 and below 0.45.

4.2.7 Severe and moderate icing (ICE) shall refer to icing in other than convective clouds. Freezing rain (FZRA) shall refer to severe icing conditions caused by freezing rain.

4.2.8 A mountain wave (MTW) shall be considered:

a) severe whenever an accompanying downdraft of 3.0 m/s (600 ft/min) or more and/or severe turbulence is observed or forecast; and

b) moderate whenever an accompanying downdraft of 1.75–3.0 m/s (350–600 ft/min) and/or moderate turbulence is observed or forecast.

4.2.9 Sandstorm/duststorm shall be considered:

a) heavy whenever the visibility is below 200 m and the sky is obscured; and

b) moderate whenever the visibility is:

1) below 200 m and the sky is not obscured; or

2) between 200 m and 600 m.

5. SPECIFICATIONS RELATED TO AERODROME WARNINGS

5.1 Format and dissemination of aerodrome warnings

5.1.1 The aerodrome warnings shall be issued in accordance with the template in the ICAO Annex 3, Appendix 6, Table A6-2 where required by operators or aerodrome services, and shall be disseminated in accordance with local arrangements to those concerned.

5.1.2 The sequence number referred to in the template in the ICAO Annex 3, Appendix 6, Table A6-2 shall correspond with the number of aerodrome warnings issued for the aerodrome since 0001 UTC on the day concerned.

5.1.3 In accordance with the template in the ICAO Annex 3, Appendix 6, Table A6-2, aerodrome warnings shall 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

— hoar frost or rime

— sandstorm

— duststorm

— rising sand or dust

— strong surface wind and gusts

— squall

— frost

— volcanic ash

— tsunami

— volcanic ash deposition

— 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.

5.1.4 The use of text additional to the abbreviations listed in the template in Table A6-2 shall be kept to a minimum. The additional text shall be prepared in abbreviated plain language using approved ICAO abbreviations and numerical values. If no ICAO approved abbreviations are available, English plain language text shall be used.

5.2 Quantitative criteria for aerodrome warnings

When quantitative criteria are necessary for the issue of aerodrome warnings covering, for example, the expected maximum wind speed or the expected total snowfall, the criteria used shall be as agreed between the aerodrome meteorological office and the users concerned.

6. SPECIFICATIONS RELATED TO WIND SHEAR WARNINGS

6.1 Detection of wind shear

Evidence of the existence of wind shear shall be derived from:

a) ground-based, wind shear remote-sensing equipment, for example, Doppler radar;

b) ground-based, wind shear detection equipment, for example, a system of surface wind and/or pressure sensors located in an array monitoring a specific runway or runways and associated approach and departure paths;

c) aircraft observations during the climb-out or approach phases of flight to be made in accordance with Chapter 4; or

d) other meteorological information, for example, from appropriate sensors located on existing masts or towers in the vicinity of the aerodrome or nearby areas of high ground.

Note.— Wind shear conditions are normally associated with the following phenomena:

— thunderstorms, microbursts, funnel cloud (tornado or waterspout), and gust fronts

— *frontal surfaces*

— *strong surface winds coupled with local topography*

— *sea breeze fronts*

— *mountain waves (including low-level rotors in the terminal area)*

— *low-level temperature inversions.*

6.2 Format and dissemination of wind shear warnings and alerts

6.2.1 The wind shear warnings shall be issued in accordance with the template in the ICAO Annex 3, Appendix 6, Table A6-3 and shall be disseminated in accordance with local arrangements to those concerned.

6.2.2 The sequence number referred to in the template in the ICAO Annex 3, Appendix 6, Table A6-3 shall correspond with the number of wind shear warnings issued for the aerodrome since 0001 UTC on the day concerned.

6.2.3 The use of text additional to the abbreviations listed in the template in the ICAO Annex 3, Appendix 6, Table A6-3 shall be kept to a minimum. The additional text shall be prepared in abbreviated plain language using approved ICAO abbreviations and numerical values. If no ICAO approved abbreviations are available, English plain language text shall be used.

6.2.4 When an aircraft report is used to prepare a wind shear warning, or to confirm a warning previously issued, the corresponding aircraft report, including the aircraft type, shall be disseminated unchanged in accordance with local arrangements to those concerned.

Note 1.— Following reported encounters by both arriving and departing aircraft, two different wind shear warnings may exist: one for arriving aircraft and one for departing aircraft.

Note 2.— Specifications for reporting the intensity of wind shear are still undergoing development. It is recognized, however, that pilots, when reporting wind shear, may use the qualifying terms "moderate", "strong" or "severe", based to a large extent on their subjective assessment of the intensity of the wind shear encountered.

6.2.5 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.

6.2.6 Where microbursts are observed, reported by pilots or detected by ground-based, wind shear detection or remote-sensing equipment, the wind shear warning and wind shear alert shall include a specific reference to microburst.

6.2.7 Where information from ground-based, wind shear detection or remote-sensing equipment is used to prepare a wind shear alert, the alert shall, if practicable, relate to specific sections of the runway and distances along the approach path or take-off path as agreed between the MET Provider, the ATS Provider and the operators concerned.

Example A6-1. SIGMET and AIRMET message and the corresponding cancellations

SIGMET YUDD SIGMET 2 VALID 101200/101600 YUSO – YUDD SHANLON FIR/UIR OBSC TS FCST S OF N54 AND E OF W012 TOP FL390 MOV E 20KT WKN	**Cancellation of SIGMET** YUDD SIGMET 3 VALID 101345/101600 YUSO – YUDD SHANLON FIR/UIR CNL SIGMET 2 101200/101600
AIRMET YUDD AIRMET 1 VALID 151520/151800 YUSO – YUDD SHANLON FIR ISOL TS OBS N OF S50 TOP ABV FL100 STNR WKN	**Cancellation of AIRMET** YUDD AIRMET 2 VALID 151650/151800 YUSO – YUDD SHANLON FIR CNL AIRMET 1 151520/151800

Example A6-2. SIGMET message for tropical cyclone

YUCC SIGMET 3 VALID 251600/252200 YUDO –
YUCC AMSWELL FIR TC GLORIA PSN N2706 W07306 CB OBS AT 1600Z WI 250NM OF TC CENTRE TOP FL500 NC FCST AT 2200Z TC CENTRE PSN N2740 W07345

Meaning:

The third SIGMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC: the message is valid from 1600 UTC to 2200 UTC on the 25th of the month; tropical cyclone Gloria at 27 degrees 6 minutes north and 73 degrees 6 minutes west: cumulonimbus was observed at 1600 UTC within 250 nautical miles of the centre of the tropical cyclone with top at flight level 500; no changes in intensity are expected: at 2200 UTC the centre of the tropical cyclone is forecast to be located at 27 degrees 40 minutes north and 73 degrees 45 minutes west.

* Fictitious location

Example A6-3. SIGMET message for volcanic ash

YUDD SIGMET 2 VALID 211100/211700 YUSO –
YUDD SHANLON FIR/UIR VA ERUPTION MT ASHVAL PSN S1500 E07348 VA CLD OBS AT 1100Z APRX 50KM WID LINE BTN S1500 E07348 – S1530 E07642 FL310/450 INTSF FCST AT 1700Z APRX 50KM WID LINE BTN S1506 E07500 – S1518 E08112 – S1712 E08330

Meaning:

The second SIGMET message issued for the SHANLON* flight information region (identified by YUDD Shanlon area control centre/upper flight information region) by the Shanlon/International* meteorological watch office (YUSO) since 0001 UTC: the message is valid from 1100 UTC to 1700 UTC on the 21st of the month; volcanic ash eruption of Mount Ashval* located at 15 degrees south and 73 degrees 48 minutes east: volcanic ash cloud observed at 1100 UTC in an approximately 50-km-wide line between 15 degrees south and 73 degrees 48 minutes east, and 15 degrees 30 minutes south and 76 degrees 42 minutes east; between flight levels 310 and 450, intensifying at 1700 UTC the volcanic ash cloud is forecast to be located in an approximately 50-km-wide line between 15 degrees 6 minutes south and 75 degrees east, 15 degrees 18 minutes south and 81 degrees 12 minutes east, and 17 degrees 12 minutes south and 83 degrees 30 minutes east.

* Fictitious location

Example A6-4. SIGMET message for radioactive cloud

YUCC SIGMET 2 VALID 201200/201600 YUDO –
YUCC AMSWELL FIR RDOACT CLD OBS AT 1155Z WI 30KM OF N6030 E02550 SFC/FL550 STNR

Meaning:

The second SIGMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1200 UTC to 1600 UTC on the 20th of the month; radioactive cloud was observed at 1155 UTC within 30 kilometres of 60 degrees 30 minutes north 25 degrees 50 minutes east between the surface and flight level 550. The radioactive cloud is stationary.

* Fictitious location

Example A6-5. SIGMET message for severe turbulence

YUCC SIGMET 5 VALID 221215/221600 YUDO –
YUCC AMSWELL FIR SEV TURB OBS AT 1210Z N2020 W07005 FL250 INTSF FCST AT 1600Z S OF N2020 AND E OF W06950

Meaning:

The fifth SIGMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1215 UTC to 1600 UTC on the 22nd of the month; severe turbulence was observed at 1210 UTC 20 degrees 20 minutes north and 70 degrees 5 minutes west at flight level 250; the turbulence is expected to strengthen in intensity; at 1600 UTC the severe turbulence is forecast to be located south of 20 degrees 20 minutes north and east of 69 degrees 50 minutes west.

* Fictitious location

Example A6-6. AIRMET message for moderate mountain wave

YUCC AIRMET 2 VALID 221215/221600 YUDO –
YUCC AMSWELL FIR MOD MTW OBS AT 1205Z N48 E010 FL080 STNR NC

Meaning:

The second AIRMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1215 UTC to 1600 UTC on the 22nd of the month; moderate mountain wave was observed at 1205 UTC at 48 degrees north and 10 degrees east at flight level 080; the mountain wave is expected to remain stationary and not to undergo any changes in intensity.

* Fictitious location

APPENDIX 7 – TECHNICAL SPECIFICATIONS RELATED TO AERONAUTICAL CLIMATOLOGICAL INFORMATION

1. PROCESSING OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

Meteorological observations for regular and alternate aerodromes shall be collected, processed and stored in a form suitable for the preparation of aerodrome climatological information.

2. EXCHANGE OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

Aeronautical climatological information shall be exchanged on request between meteorological authorities. Operators and other aeronautical users desiring such information shall normally apply to the MET Provider who is responsible for its preparation.

3. CONTENT OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

3.1 Aerodrome climatological tables

3.1.1 An aerodrome climatological table shall give as applicable:

a) mean values and variations therefrom, including maximum and minimum values, of meteorological elements (for example, of air temperature); and/or

b) the frequency of occurrence of present weather phenomena affecting flight operations at the aerodrome (for example, of sandstorms); and/or

c) the frequency of occurrence of specified values of one, or of a combination of two or more, elements (for example, of a combination of low visibility and low cloud).

3.1.2 Aerodrome climatological tables shall include information required for the preparation of aerodrome climatological summaries in accordance with 3.2.

3.2 Aerodrome climatological summaries

Aerodrome climatological summaries shall cover:

a) frequencies of the occurrence of runway visual range/visibility and/or height of the base of the lowest cloud layer of BKN or OVC extent below specified values at specified times;

b) frequencies of visibility below specified values at specified times;

c) frequencies of the height of the base of the lowest cloud layer of BKN or OVC extent below specified values at specified times;

d) frequencies of occurrence of concurrent wind direction and speed within specified ranges;

e) frequencies of surface temperature in specified ranges of 5°C at specified times; and

f) mean values and variations therefrom, including maximum and minimum values of meteorological elements required for operational planning purposes, including take-off performance calculations.

Note.— Models of climatological summaries related to a) to e) are given in the Technical Regulations (WMO-No. 49), Volume II — Meteorological Service for International Air Navigation, Part III.

APPENDIX 8 – TECHNICAL SPECIFICATIONS RELATED TO SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

Text in this Appendix that is formatted in the Franklin Gothic Book font (sample text) *is published for the guidance of the MET Provider.*

1. MEANS OF SUPPLY AND FORMAT OF METEOROLOGICAL INFORMATION

1.1 Meteorological information shall be supplied to operators and flight crew members by one or more of the following, as agreed between the MET Provider and the operator concerned, and with the order shown below not implying priorities:

a) written or printed material, including specified charts and forms;

b) data in digital form;

c) briefing;

d) consultation;

e) display; or

f) in lieu of a) to e), by means of an automated pre-flight information system providing self-briefing and flight documentation facilities while retaining access by operators and aircrew members to consultation, as necessary, with the aerodrome meteorological office, in accordance with 5.1.

1.2 The MET Provider, 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.

1.3 On request by the operator, the meteorological information supplied for flight planning shall include data for the determination of the lowest usable flight level.

2. SPECIFICATIONS RELATED TO INFORMATION FOR PRE-FLIGHT PLANNING AND IN-FLIGHT REPLANNING

2.1 Format of upper-air gridded information

Upper-air gridded information supplied by the world area forecast centres (WAFCs) for pre-flight and in-flight replanning is in the GRIB code form.

Note.— The GRIB code form is contained in the Manual on Codes *(WMO-No. 306), Volume I.2, Part B* — Binary Codes.

2.2 Format of information on significant weather

2.2.1 Information on significant weather supplied by WAFCs for pre-flight planning and in-flight replanning is in the BUFR code form.

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

2.2.2 In addition to 2.2.1, information on significant weather supplied by WAFCs for pre-flight planning and in-flight replanning should be in IWXXM GML form.

Note 1.— Guidance on the implementation of IWXXM is provided in the Manual on the ICAO Meteorological Information Exchange Model (IWXXM) *(Doc 10003).*

Note 2. — Geography markup language (GML) is an encoding standard of the Open Geospatial Consortium (OGC).

2.3 Specific needs of helicopter operations

Meteorological information for pre-flight planning and in-flight replanning by operators of helicopters flying to offshore structures shall include data covering the layers from sea level to flight level 100. Particular mention shall be made of the expected surface visibility, the amount, type (where available), base and tops of cloud below flight level 100, sea state and sea-surface temperature, mean sea-level pressure, and the occurrence and expected occurrence of turbulence and icing, as determined by regional air navigation agreement.

3. SPECIFICATIONS RELATED TO BRIEFING AND CONSULTATION

3.1 Information required to be displayed

The material displayed shall be readily accessible to the flight crew members or other flight operations personnel concerned.

4. SPECIFICATIONS RELATED TO FLIGHT DOCUMENTATION

4.1 Presentation of information

4.1.1 The flight documentation related to forecasts of upper wind and upper-air temperature and SIGWX phenomena shall be presented in the form of charts. For low-level flights, alternatively, GAMET area forecasts shall be used.

Note.— Models of charts and forms for use in the preparation of flight documentation are given in Appendix 1. These models and methods for their completion are developed by the WMO on the basis of relevant operational requirements stated by ICAO.

4.1.2 The flight documentation related to concatenated route-specific upper wind and upper-air temperature forecasts shall be provided as agreed between the MET Provider and the operator concerned.

4.1.3 METAR and SPECI (including trend forecasts as issued in accordance with regional air navigation agreement), TAF, GAMET, SIGMET and AIRMET, volcanic ash, tropical cyclone and space weather advisory information shall be presented in accordance with the templates in Appendices 1, 2, 3, 5 and 6. Such meteorological information received from other meteorological offices shall be included in flight documentation without change.

Note.— Examples of the form of presentation of METAR/SPECI and TAF are given in Appendix 1.

4.1.4 The location indicators and the abbreviations used shall be explained in the flight documentation.

4.1.5 The forms and the legend of charts included in flight documentation should be printed in English. Where appropriate, approved abbreviations shall be used. The units employed for each element shall be indicated; they shall be in accordance with Part V of the Civil Aviation (ANS) Regulations 2024.

4.2 Charts in flight documentation

4.2.1 Characteristics of charts

4.2.1.1 Charts included in flight documentation shall have a high standard of clarity and legibility and shall have the following physical characteristics:

a) for convenience, the largest size of charts shall be about 42 × 30 cm (standard size A3) and the smallest size shall be about 21 × 30 cm (standard size A4). The choice between these sizes shall depend on the route lengths and the amount of detail that

needs to be given in the charts as agreed between the meteorological authorities and the users concerned;

b) major geographical features, such as coastlines, major rivers and lakes shall be depicted in a way that makes them easily recognizable;

c) for charts prepared by computer, meteorological data shall take preference over basic chart information, the former cancelling the latter wherever they overlap;

d) major aerodromes shall be shown as a dot and identified by the first letter of the name of the city the aerodrome serves as given in Table AOP of the relevant regional air navigation plan;

e) a geographical grid shall be shown with meridians and parallels represented by dotted lines at each 10° latitude and longitude; dots shall be spaced one degree apart;

f) latitude and longitude values shall be indicated at various points throughout the charts (i.e. not only at the edges); and

g) labels on the charts for flight documentation shall be clear and simple and shall present the name of the world area forecast centre or, for non-world area forecast system (WAFS) products, the originating centre, the type of chart, date and valid time and, if necessary, the types of units used in an unambiguous way.

Note.— When plotting shapes, particularly polygons, on maps, appropriate corrections are necessary if plotted on projections different to that used in the production of the original forecast area.

4.2.1.2 Meteorological information included in flight documentation shall be represented as follows:

a) winds on charts shall be depicted by arrows with feathers and shaded pennants on a sufficiently dense grid;

b) temperatures shall be depicted by figures on a sufficiently dense grid;

c) wind and temperature data selected from the data sets received from a world area forecast centre shall be depicted in a sufficiently dense latitude/longitude grid; and

d) wind arrows shall take precedence over temperatures and either shall take precedence over chart background.

4.2.1.3 For short-haul flights, charts shall be prepared covering limited areas at a scale of 1:15 $\times 10^6$ as required.

4.2.2 Set of charts to be provided

4.2.2.1 The minimum number of charts for flights between flight level 250 and flight level 630 shall include a high-level SIGWX chart (flight level 250 to flight level 630) and a forecast 250 hPa wind and temperature chart. The actual charts provided for pre-flight and in-flight planning and for flight documentation shall be as agreed between meteorological authorities and users concerned.

4.2.2.2 Charts to be provided 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 MET Provider and the operator concerned.

4.2.3 Height indications

In flight documentation, height indications shall be given as follows:
a) all references to en-route meteorological conditions, such as height indications of upper winds, turbulence or bases and tops of clouds, shall preferably be expressed in flight levels; they may also be expressed in pressure, altitude or, for low-level flights, height above ground level; and
b) all references to aerodrome meteorological conditions, such as height indications of the bases of clouds, shall be expressed in height above the aerodrome elevation.

4.3 Specifications related to low-level flights

4.3.1 In chart form

Where the forecasts are supplied in chart form, flight documentation for low-level flights, including those in accordance with the visual flight rules, operating up to flight level 100 (or up to flight level 150 in mountainous areas or higher, where necessary), shall contain the following as appropriate to the flight:

a) information from relevant SIGMET and AIRMET messages;

b) upper wind and upper-air temperature charts as given in Appendix 5, 4.3.1; and

c) significant weather charts as given in Appendix 5, 4.3.2.

4.3.2 In abbreviated plain language

Where the forecasts are not supplied in chart form, flight documentation for low-level flights, including those in accordance with the visual flight rules, operating up to flight level 100 (up to flight level 150 in mountainous areas or higher, where necessary), should contain the following information as appropriate to the flight:

a) SIGMET and AIRMET information; and

b) GAMET area forecasts.

Note.— An example of the GAMET area forecast is given in Appendix 5.

5. SPECIFICATIONS RELATED TO AUTOMATED PRE-FLIGHT INFORMATION SYSTEMS FOR BRIEFING, CONSULTATION, FLIGHT PLANNING AND FLIGHT DOCUMENTATION

5.1 Access to the systems

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.

5.2 Detailed specifications of the systems

Automated pre-flight information systems for the supply of meteorological information for self-briefing, pre-flight planning and flight documentation shall:

a) provide for the continuous and timely updating of the system database and monitoring of the validity and integrity of the meteorological information stored;

b) permit access to the system by operators and flight crew members and also by other aeronautical users concerned through suitable telecommunications means;

c) use access and interrogation procedures based on abbreviated plain language and, as appropriate, ICAO location indicators, and aeronautical meteorological code data-type designators prescribed by WMO, or based on a menu-driven user interface, or other appropriate mechanisms as agreed between the MET Provider and the operators concerned; and

d) provide for rapid response to a user request for information.

Note.— ICAO abbreviations and codes and location indicators are given respectively in the ICAO Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400) and* ICAO Location Indicators *(Doc 7910). Aeronautical meteorological code data-type designators are given in the* Manual on the Global Telecommunication System *(WMO-No. 386).*

6. SPECIFICATIONS RELATED TO INFORMATION FOR AIRCRAFT IN FLIGHT

6.1 Supply of information requested by an aircraft in flight

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

6.2 Information for in-flight planning by the operator

Meteorological information for planning by the operator for aircraft in flight should be supplied during the period of the flight and should normally consist of any or all of the following:

a) METAR and SPECI (including trend forecasts as issued in accordance with regional air navigation agreement);

b) TAF and amended TAF;

c) SIGMET and AIRMET information and special air-reports relevant to the flight, unless the latter have been the subject of a SIGMET message;

d) upper wind and upper-air temperature information;

e) volcanic ash and tropical cyclone advisory information relevant to the flight; and

f) other meteorological information in alphanumeric or graphical form as agreed between the MET Provider and the operator concerned.

Note.— Guidance on the display of graphical information in the cockpit is provided in ICAO Doc 8896.

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

1. INFORMATION TO BE PROVIDED FOR AIR TRAFFIC SERVICES UNITS

1.1 List of information for the aerodrome control tower

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

a) local routine reports, local special reports, METAR, SPECI, TAF, trend forecasts and amendments thereto, for the aerodrome concerned;

b) SIGMET and AIRMET information, wind shear warnings and alerts and aerodrome warnings;

c) any additional meteorological information agreed upon locally, such as forecasts of surface wind for the determination of possible runway changes;

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

e) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the MET Provider and ATS Provider concerned.

1.2 List of information for the approach control unit

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

a) local routine reports, local special reports, METAR, SPECI, TAF, trend forecasts and amendments thereto, for the aerodrome(s) with which the approach control unit is concerned;

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

c) any additional meteorological information agreed upon locally;

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

e) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the MET Provider and ATS Provider concerned.

1.3 List of information for the area control centre and flight information centre

The following meteorological information shall be supplied, as necessary, to an area control centre or a flight information centre by its associated meteorological watch office:

a) METAR and SPECI, including current pressure data for aerodromes and other locations, TAF and trend forecasts and amendments thereto, covering the flight information region (FIR) or the control area (CTA) and, if required by the flight information centre (FIC) or area control centre (ACC), covering aerodromes in neighbouring FIRs, as determined by regional air navigation agreement;

b) forecasts of upper winds, upper-air temperatures and significant en-route weather phenomena and amendments thereto, particularly those which are likely to make operation under visual flight rules impracticable, SIGMET and AIRMET information and appropriate special air-reports for the FIR or CTA and, if determined by regional air navigation agreement and required by the FIC or ACC, for neighbouring FIRs;

c) any other meteorological information required by the FIC or ACC to meet requests from aircraft in flight; if the information requested is not available in the associated meteorological watch office (MWO), that office shall request the assistance of another meteorological office in supplying it;

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

e) information received concerning the release of radioactive material into the atmosphere, as agreed between the MET Provider and ATS Provider concerned;

f) tropical cyclone advisory information issued by a tropical cyclone advisory centre in its area of responsibility;

g) volcanic ash advisory information issued by a volcanic ash advisory centre in its area of responsibility; and

h) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the MET Provider and ATS Provider concerned.

1.4 Supply of information to aeronautical telecommunications stations

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.

1.5 Format of information

1.5.1 Local routine reports, local special reports, METAR, SPECI, TAF, trend forecasts, SIGMET and AIRMET information, upper wind and upper-air temperature forecasts and amendments thereto shall be supplied to ATS units in the form in which they are prepared, disseminated to other aerodrome meteorological offices or MWOs, or received from other aerodrome meteorological offices or MWOs, unless otherwise agreed locally.

1.5.2 When computer-processed upper-air data for grid points are made available to ATS units in digital form for use by ATS computers, the contents, format and transmission arrangements shall be as agreed between the MET Provider and the ATS Provider. The data shall normally be supplied as soon as is practicable after the processing of the forecasts has been completed.

2. INFORMATION TO BE PROVIDED FOR SEARCH AND RESCUE SERVICES UNITS

2.1 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.

2.2 Information to be provided on request

2.2.1 On request from the rescue coordination centre, the designated aerodrome meteorological office or MWO shall arrange to obtain details of the flight documentation which was supplied to the missing aircraft, together with any amendments to the forecast which were transmitted to the aircraft in flight.

2.2.2 To facilitate search and rescue operations, the designated aerodrome meteorological office or MWO shall, on request, supply:

a) complete and detailed information on the current and forecast meteorological conditions in the search area; and

b) current and forecast conditions en route, covering flights by search aircraft from and returning to the aerodrome from which the search is being conducted.

2.2.3 On request from the rescue coordination centre, the designated aerodrome meteorological office or MWO shall supply or arrange for the supply of meteorological information required by ships undertaking search and rescue operations.

3. INFORMATION TO BE PROVIDED FOR AERONAUTICAL INFORMATION SERVICES UNITS

3.1 List of information

The following information shall be supplied, as necessary, to an AIS Provider:

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

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 meteorological service for air navigation. This information is required to be provided to the AIS Provider sufficiently in advance of the effective date to permit issuance of NOTAM in compliance with the Civil Aviation Requirements for AIS 2024;

2) the occurrence of volcanic activity; and

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

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

1) expected important changes in meteorological service for air navigation procedures, services and facilities provided; and

2) effect of certain weather phenomena on aircraft operations.

APPENDIX 10 – TECHNICAL SPECIFICATIONS RELATED TO REQUIREMENTS FOR AND USE OF COMMUNICATIONS

*Text in this Appendix that is formatted in the Franklin Gothic Book font (*sample text*) is published for the guidance of the MET Provider.*

1. SPECIFIC REQUIREMENTS FOR COMMUNICATIONS

1.1 Required transit times of operational meteorological information

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.

1.2 Grid point data for ATS and operators

1.2.1 When upper-air data for grid points in digital form are made available for use by ATS computers, the transmission arrangements shall be as agreed between the MET Provider and the ATS Provider.

1.2.2 When upper-air data for grid points in digital form are made available to operators for flight planning by computer, the transmission arrangements shall be as agreed between the WAFC concerned, the MET Provider and the operators concerned.

2. USE OF AERONAUTICAL FIXED SERVICE COMMUNICATIONS AND THE PUBLIC INTERNET

2.1 Meteorological bulletins in alphanumeric format

2.1.1 Composition of bulletins

Whenever possible, exchanges of operational meteorological information shall be made in consolidated bulletins of the same types of meteorological information.

2.1.2 Filing times of bulletins

Meteorological bulletins required for scheduled transmissions shall be filed regularly and at the prescribed scheduled times. METAR shall be filed for transmission not later than 5 minutes after the actual time of observation. TAF shall be filed for transmission not earlier than one hour prior to the beginning of their validity period.

2.1.3 Heading of bulletins

Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service or the public Internet shall contain a heading consisting of:
a) an identifier of four letters and two figures;
b) the ICAO four-letter location indicator corresponding to the geographical location of the meteorological office originating or compiling the meteorological bulletin;
c) a day-time group; and
d) if required, a three-letter indicator.

Note.— Detailed specifications on format and contents of the heading are given in the Manual on the Global Telecommunication System (WMO-No. 386) and are reproduced in the Manual of Aeronautical Meteorological Practice (Doc 8896).

2.1.4 Transmission of bulletins containing operational meteorological information

Meteorological bulletins containing operational meteorological information shall be transmitted via the aeronautical fixed service (AFS).

2.2 World area forecast system (WAFS) products

2.2.1 Telecommunications for the supply of WAFS products

The telecommunications facilities used for the supply of WAFS products should be the aeronautical fixed service or the public Internet.

2.2.2 Quality requirements for charts

Where WAFS products are disseminated in chart form, the quality of the charts received should be such as to permit reproduction in a sufficiently legible form for flight planning and documentation. Charts received should be legible over 95 per cent of their area.

2.2.3 Quality requirements for transmissions

Transmissions should be such as to ensure that their interruption should not exceed 10 minutes during any period of 6 hours.

2.2.4 Heading of bulletins containing WAFS products

Meteorological bulletins containing WAFS products in digital form to be transmitted via aeronautical fixed service or the public Internet contain a heading as given in 2.1.3.

3. USE OF AERONAUTICAL MOBILE SERVICE COMMUNICATIONS

3.1 Content and format of meteorological messages

3.1.1 The content and format of reports, forecasts and SIGMET information transmitted to aircraft shall be consistent with the provisions of Chapters 3, 5 and 6 of these Requirements.

3.1.2 The content and format of air-reports transmitted by aircraft shall be consistent with the provisions of Chapter 4 of these Requirements and the ICAO Doc 4444, Appendix 1.

3.2 Content and format of meteorological bulletins

The substance of a meteorological bulletin transmitted via the aeronautical mobile service shall remain unchanged from that contained in the bulletin as originated.

4. USE OF AERONAUTICAL DATA LINK SERVICE — D-VOLMET

4.1 Detailed content of meteorological information available for D-VOLMET

4.1.1 The aerodromes for which METAR, SPECI and TAF are to be available for uplink to aircraft in flight shall be determined by regional air navigation agreement.

4.1.2 The flight information regions (FIRs) for which SIGMET and AIRMET messages are to be available for uplink to aircraft in flight shall be determined by regional air navigation agreement.

4.2 Criteria related to information to be available for D-VOLMET

4.2.1 The latest available METAR, SPECI and TAF, and valid SIGMET and AIRMET shall be used for uplink to aircraft in flight.

4.2.2 TAF included in the D-VOLMET shall be amended as necessary to ensure that a forecast, when made available for uplink to aircraft in flight, reflects the latest opinion of the aerodrome meteorological office concerned.

4.2.3 If no SIGMET message is valid for an FIR, an indication of "NIL SIGMET" shall be included in the D-VOLMET.

4.3 Format of information to be available for D-VOLMET

The content and format of reports, forecasts and SIGMET and AIRMET information included in D-VOLMET shall be consistent with the provisions of Chapters 3, 5 and 6 of these Requirements.

5. USE OF AERONAUTICAL BROADCASTING SERVICE — VOLMET BROADCASTS

5.1 Detailed content of meteorological information to be included in VOLMET broadcasts

5.1.1 The aerodromes for which METAR, SPECI and TAF are to be included in VOLMET broadcasts, the sequence in which they are to be transmitted and the broadcast time shall be determined by regional air navigation agreement.

5.1.2 The FIRs for which SIGMET messages are to be included in scheduled VOLMET broadcasts shall be determined by regional air navigation agreement. Where this is done, the SIGMET message shall be transmitted at the beginning of the broadcast or of a five-minute time block.

5.2 Criteria related to information to be included in VOLMET broadcasts

5.2.1 When a report has not arrived from an aerodrome in time for a broadcast, the latest available report shall be included in the broadcast, together with the time of observation.

5.2.2 TAF included in scheduled VOLMET broadcasts shall be amended as necessary to ensure that a forecast, when transmitted, reflects the latest opinion of the aerodrome meteorological office concerned.

5.2.3 Where SIGMET messages are included in scheduled VOLMET broadcasts, an indication of "NIL SIGMET" shall be transmitted if no SIGMET message is valid for the FIRs concerned.

5.3 Format of information to be included in VOLMET broadcasts

5.3.1 The content and format of reports, forecasts and SIGMET information included in VOLMET broadcasts shall be consistent with the provisions of Chapters 3, 5 and 6 of these Requirements.

5.3.2 VOLMET broadcasts shall use standard radiotelephony phraseologies.

Note.— Guidance on the standard radiotelephony phraseologies to be used in VOLMET broadcasts is given in the ICAO Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services *(Doc 9377), Appendix 1.*

Made this 16th day of May 2024.

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Director-General

For the Guyana Civil Aviation Authority