

**EXEMPTION FROM PARAGRAPH 804.01(c) OF THE
CANADIAN AVIATION REGULATIONS AND FROM THE MANUAL OF SURFACE
WEATHER OBSERVATIONS**

Pursuant to subsection 5.9(2) of the *Aeronautics Act*, and after taking into account that the exemption is in the public interest and is not likely to affect aviation safety, I hereby exempt persons who provide automated aviation weather services, from the requirements of the *Manual of Surface Weather Observations* made pursuant to paragraph 804.01(c) of the *Canadian Aviation Regulations* (CARs), subject to the following conditions.

Paragraph 804.01(c) of the CARs states that a person who provides aviation weather services shall provide the services in accordance with the standards specified in the *Manual of Surface Weather Observations*.

PURPOSE

The purpose of this exemption is to permit persons to provide aviation weather services consisting of automated observation and reporting of any or all of the following: wind direction, speed and character; visibility; present weather; sky condition; temperature; dewpoint temperature or atmospheric pressure. These services, when provided by automated observation and reporting, are not provided in accordance with the existing standards in the *Manual of Surface Weather Observation*.

APPLICATION

This exemption applies to persons who provide aviation weather services consisting of automated observation and reporting of any or all of the following: wind direction, speed and character; visibility; present weather; sky condition; temperature; dewpoint temperature or atmospheric pressure.

CONDITIONS

This exemption is subject to the following conditions

1. Subject to section 803.01 of the *Canadian Aviation Regulations*, a service provider shall notify the Minister in advance of commencing to provide these services or making changes to services already being provided;
2. This notification shall include the following information:
 - (a) the name, address and telephone number (and e-mail address, as applicable) of
 - (i) the service provider,

- (ii) any person with whom the service provider has entered into an agreement to provide meteorological observations on their behalf,
 - (iii) the person providing maintenance of the meteorological instrumentation to be used,
 - (iv) the aerodrome or meteorological station, and its geographical coordinates, where the meteorological observation will be provided;
- (b) a summary description of the service to be provided;
- (c) the manufacturer and type of meteorological instrumentation used to make the meteorological observations;
- (d) the meteorological elements being reported;
- (e) for new or significantly modified meteorological instruments or meteorological systems, the name, address and telephone number (and e-mail address, as applicable) of
- (i) the person who tested the meteorological instrumentation and meteorological system to verify its compliance with the accuracy standard,
 - (ii) the person who provided the verification of the test data in accordance with requirements of the accuracy standards.
- (f) for those services for which paragraph (e) is applicable, a copy of the written confirmation of the verification report;

3. Each person providing meteorological observations under the authority of this exemption, shall do so in accordance with the conditions in Annex A attached to this exemption;

4. Service providers shall continue to comply with all applicable requirements of Annex 3 to the Convention as referenced by *Canadian Aviation Regulations* paragraph 804.01 (a);

5. The service provider shall notify the Minister if the aviation weather services provided under the authority of this exemption are discontinued;

6. No service provider shall permit a person other than a person qualified in accordance with Annex A to provide aviation weather services;

7. Any service provider who provides services in accordance with this exemption that are not in full compliance with Annex A shall have an implementation plan for entering into compliance with all provisions, which is acceptable to the Minister; and

8. The service provider shall keep the implementation plan required by condition 7 up to date and shall make it available to the Minister upon reasonable notice given by the Minister.

VALIDITY

This exemption comes into force at 00:00 EST on January 6, 2007 is in effect until the earliest of the following:

(a) the date on which an amendment to the appropriate provision of the *Canadian Aviation Regulations* and associated standards directly related to the subject matter of this exemptions comes into effect;

(b) the date on which any of the conditions of this exemption is breached; or

(c) the date on which this exemption is canceled, in writing, by the Minister of Transport, where he is of the opinion that it is no longer in the public interest or that it is likely to affect aviation safety.

DATED at Ottawa, Ontario, Canada this 9TH day of JANUARY 2007, on behalf of the Minister of Transport.



for D. B. Sherritt

Director, Aerodromes and Air Navigation
Civil Aviation

on behalf of the Minister of Transport, Infrastructure and Communities

DEFINITIONS

“aviation weather services” means the specification of the location and frequency of weather observations and forecasts for aviation purposes in accordance with the *Aeronautics Act* and regulations made under that Act, the procurement of those observations and forecasts and the dissemination of weather information for aviation purposes, including the dissemination by weather briefings;

“clinical human observations” means a qualified meteorological observer;

- (1) located adjacent to the meteorological instruments or meteorological systems being examined,
- (2) who has no priorities or duties which conflict with the observation and reporting of all changes that impact upon the meteorological elements of interest, and
- (3) who has access, at a minimum, to the current observing aids normally available to an observer who is observing those elements;

“meteorological element” means any one or more of, but is not limited to: wind direction, speed and character, Runway Visual Range, visibility, present weather, sky condition, temperature, dew-point temperature and atmospheric pressure (altimeter setting) each as defined by the World Meteorological Organization in WMO No, 8 unless otherwise stated in these regulations;

“meteorological observation” means a quantitative or qualitative evaluation by instrumental or visual means of one or more meteorological elements at a place at a given time;

“meteorological report” means a statement, presented in plain language or in code, either orally, in written form or by telecommunication, of past or present meteorological conditions;

“meteorological station” means a site where meteorological observations are made;

“meteorological system” means one or a set of meteorological instruments, and their associated sensors and electronic circuit parts that function together as a whole to provide meteorological observations or meteorological report;

“operational conditions” means those conditions or set of conditions that are encountered or expected to be encountered during the time a meteorological instrument is performing its normal operational function in full compliance with its performance specification;

“Prevailing visibility” – means the greatest visibility common to at least half the horizon circle from a height representative of approximately 1.5 metres above the ground from a point which has a minimum of visual obstructions;

“Qualified person” means a person who meets the requirements of this exemption for the service being provided;

“Service provider” means any person or organization responsible for providing aviation weather services which meets the application of this exemption.

1. TRAINING AND QUALIFICATIONS

1.1 The service provider shall maintain detailed training records and individually certify that all persons providing installation, commissioning, inspection and maintenance services are qualified persons who have received training and have demonstrated sufficient knowledge, skills and competence to perform their assigned duties.

Note: Documentation should be available from the manufacturer indicating the training and qualifications required by personnel who engage in these duties.

1.2 The service provider shall document 1.1 and make a copy available to the Minister, upon reasonable request of the Minister.

2. INSTALLATION, SITING, OPERATION AND MAINTENANCE OF METEOROLOGICAL SYSTEMS

2.1 The service provider shall establish and follow practices, procedures and specifications for the siting, installation, commissioning, operation and maintenance of meteorological systems.

2.2 The service provider shall document the practices, procedures and specifications established and followed in accordance with subsection 2.1 and shall provide all of the relevant information to the Minister upon reasonable notice given by the Minister.

2.3 Except as otherwise required by these regulations and subject to subsection 2.4, meteorological instruments shall be exposed in accordance with the practices, procedures and specifications established by the World Meteorological Organization (WMO) in the *Guide to Meteorological Instruments and Methods of Observation*, WMO-No.8, or equivalent developed by the service provider.

2.4 Where the requirements of subsection 2.3 cannot be met, the service provider shall document the irregularity in the exposure of the meteorological instruments and make all of the relevant information available to the Minister upon reasonable request of the Minister.

2.5 The service provider shall coordinate the siting and construction of equipment and installation with the aerodrome operator.

Notes: Specifications concerning the siting and construction of equipment and installations, aimed at reducing the hazard to aircraft to a minimum, are contained in TP 312, Aerodrome Standards and Recommended Practices. Guidance for the installation and siting of sensors is found in the Guide to Meteorological Instruments and Methods of Observation, WMO-No. 8.

3. ACCURACY OF METEOROLOGICAL INSTRUMENTS AND SYSTEMS

3.1 The service provider shall obtain test data and establish practices and procedures that demonstrate that the meteorological observations made using the meteorological instruments and meteorological system meet the accuracy requirements established for each element.

3.2 The service provider shall make the documentation required by subsection 3.1 available to the Minister upon reasonable request of the Minister.

3.3 The service provider shall obtain test data which demonstrate compliance of the meteorological instruments and meteorological systems with subsection 3.1 in accordance with the following requirements;

(a) the test data shall be sufficiently complete to assure that the test results are representative of the design and manufacturing processes associated with the systems and include the results of the following:

(i) for those instruments for which it is practical, the relationship between the value indicated by an instrument and the corresponding known value of a measurand,

(ii) the testing of instruments over a range that is representative of the expected environmental conditions (regardless of whether in a controlled environment or in the field),

(iii) testing of the instruments in comparison with other instruments or human observations, in the outdoor operational environment , where practical;

(b) The test data shall consist of the following:

(i) raw data collected during testing, and

(ii) the results of the reduction and analysis of the data;

(c) The person verifying the test data in accordance with paragraph (d) shall confirm that the results of the reduction and analysis of the test data demonstrate that the meteorological instruments and meteorological system meet the accuracy requirements set out in this Annex for each observed element in the operational conditions of the meteorological station.

(d) The service provider shall ensure that the test data have been verified as meeting the accuracy requirements of subsection (1) by a person who;

(i) performs the verification in accordance with the requirements set out in the *Guide to Meteorological Instruments and Methods of Observation*, WMO-No. 8, as amended from time to time, or equivalent developed by the service provider and is either

- (A) independent from the manufacturer of the meteorological instruments and from the service provider and has a degree in meteorology or the natural or applied sciences or mathematics from a recognized university and experience in: instrumental references, standards and traceability; methods of statistical analysis and an understanding of the operating principles and use of meteorological instruments; or
- (B) a licenced professional engineer (P. Eng) in Canada.

(e) The service provider shall obtain a written confirmation of the verification of the test data from the person who verified the test data pursuant to paragraph (d) and shall, upon reasonable notice of the Minister, provide a copy to the Minister.

(f) The service provider shall follow a commissioning protocol and establish proof of performance of newly installed sensors or meteorological systems that are in accordance with methods established by the manufacturer, or equivalent documentation developed by the service provider.

(g) The service provider shall ensure that instruments have built in quality checks that, in the event of failure, prevent a report from being issued.

(h) The service provider shall ensure that the accuracy of the timing methods or device used to establish the time of the meteorological observation is sufficient for the intended purpose.

(i) The service provider shall document the processes and procedures used to comply with the requirements of paragraphs (f) to (h) and shall make them available to the Minister upon reasonable request of the Minister.

New or modified Instruments

3.4 No new or significantly modified meteorological instruments or meteorological systems for the automated reporting of visibility, present weather, or sky conditions shall be introduced into service or continue in operation unless their performance characteristics, limitations and sources of potential failure and a detailed comparison against human observations have been quantified and documented.

3.5 The service provider shall, upon request, provide a summary of the documentation required by subsection 3.4 to users of the meteorological reports based on these instruments or systems or to the Minister.

Note: A significant modification to a meteorological instrument is one that would change its performance in a manner which could reasonably affect the decision making of a pilot.

4. Technical Requirements for METEOROLOGICAL OBSERVATIONS AND REPORTS

4.1 The service provider shall establish and document practices and procedures for compliance with the provisions of subsections 4.2 to 4.17, which are applicable to the services be provided and make a copy of the documentation available to the Minister upon reasonable request of the Minister.

WIND

4.2 Meteorological observations of surface wind shall meet the following requirements:

- (a) the wind measurements shall be representative of winds which are 10 m above the ground over level terrain at a distance equal to at least 10 times the height of any object from that object or, if this is not possible, at such a height and location that the indications are reasonably unaffected by local obstructions; and
- (b) the instruments shall function for winds of up to and including at least 100 knots speed.

4.3 Meteorological observations of surface wind shall meet the following requirements:

(a) The wind measurement shall include:

- (i) direction,
- (ii) speed, and
- (iii) character, if applicable;

(b) The wind direction from which the wind is blowing and the wind speed shall be averaged over a two-minute period,

4.4 The following shall apply to reports of wind direction and speed:

(a) Subject to paragraph (b) the wind direction from which the wind is blowing shall be reported in tens of degrees with reference to true north;

(b) for voice communications purposes in support of take-off or landing operations in the Southern Domestic Airspace wind direction shall be reported in tens of degrees with reference to magnetic north;

(c) The wind speed shall be reported in knots;

(d) Winds of less than 2 knots shall be reported as "calm";

(e) The wind character shall be reported as a "gust" if wind speed data for the most recent ten minutes indicate rapid fluctuations in wind speed with;

(i) a peak wind speed that exceeds the current two-minute mean wind speed by 5 knots or more, and

(ii) the highest peak wind speed is at least 15 knots;

(f) The speed of a gust shall be the maximum wind speed averaged over a maximum of a 5 second period, in knots;

(g) Variations from the mean wind direction during the past 10-minute shall be reported as follows, if the total variation is 60° or more;

(i) when total variation is between 60° and 180° and the wind speed is 3 knots or more such directional variation shall be reported as the two extreme directions in clockwise order between which the surface wind has varied; or

(ii) when the total variation is between 60° and 180° and the wind speed is less than 3 knots, the wind direction shall be reported as variable with no mean wind direction; or

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

4.5 The accuracy of wind sensors and wind reports shall be such that;

(a) the direction is correctly reported within $\pm 10^\circ$;

(b) the mean speed is correctly reported within ± 2 knots up to 20 knots and within 10% above 20 knots

4.6 The accuracy of the wind instruments shall be established in accordance with subsection 4.5 paragraphs (a) and (b) to at least a 95% confidence in wind tunnel testing.

VISIBILITY

4.7 The observation of visibility shall meet the following requirements;

(a) If the visibility cannot be determined, in accordance with these standards, then it shall be missing.

(b) The reportable values of visibility shall be;

(i) zero, one-eighth, one-quarter, three-eighths, one-half, five-eighths and three-quarters of a statute mile for visibility up to but not including one statute mile,

(ii) by increments of one-quarter of a statute mile for visibility of one statute mile up to and including 2 ½ statute miles,

(iii) increments of one statute mile from three miles up to and including 15 statute miles, and

(iv) increments of 5 miles from 20 miles to 150 statute miles;

- (c) If the observed value of visibility is between two reportable values then the lower value shall be reported;

4.8 The following shall apply to visibility observation instruments,

- (a) they shall incorporate a background luminance sensor that is accurate to within 10% with at least a 90% confidence;
- (b) the Meteorological Optical Range, as defined by the World Meteorological Organization shall be determined:
- (i) within $\frac{1}{4}$ statute mile of the value of a reference transmissometer from $\frac{1}{4}$ mile to 1 mile at least 80% of the time;
 - (ii) within $\frac{1}{4}$ statute mile above and within $\frac{1}{2}$ mile below the value of a reference transmissometer, or clinic human observations, from $1\frac{1}{4}$ statute miles to $1\frac{3}{4}$ statute miles at least 80% of the time;
 - (iii) within $\pm \frac{1}{2}$ statute mile of the value of a reference transmissometer, or clinic human observations, from 2 statute miles to $2\frac{1}{2}$ statute miles at least 80% of the time;
 - (iv) within $\frac{1}{2}$ statute mile above or within 1 statute mile below the value of a reference transmissometer, or clinic human observations, from 3 statute miles to $3\frac{1}{2}$ statute miles at least 80% of the time;
 - (v) within \pm one statute mile of the value of a reference transmissometer, or clinic human observations, from 4 statute miles to 6 statute miles at least 80% of the time; and
 - (vi) meet criteria established and documented by the service provider for visibility greater than 6 statute miles.

PRESENT WEATHER

4.9 Meteorological systems used for the observation of present weather shall:

- (a) meet or exceed accuracy requirements as follows with reference to clinical human observations;
- (i) correctly detect the presence of precipitation of at water equivalent rate of at least 0.2 mm per hour, other than drizzle, at least 90% of the time,
 - (ii) correctly report the presence of and distinguish between liquid or frozen precipitation, of a water equivalent rate of at least 0.2 mm per hour, at least 80% of the time,
 - (iii) at least a 90% probability of detection of the presence of ice accretion or freezing precipitation, of at least a light intensity,
 - (iv) at least a 80% probability of detection of thunderstorms within 5 nautical miles of the station should five or more thunderstorm days per year be expected by the climatology for the site.

- (b) except as permitted in accordance with (c) shall differentiate between and, where applicable determine the intensity of; rain, freezing rain and snow.
- (c) indicate unknown precipitation type if the type cannot be determined.

Sky Condition

4.10 The following shall apply to reports of sky condition:

(a) The reportable values of cloud base or vertical visibility into an obscuring layer shall be;

- (i) in increments of 100 feet up to and including 10,000 feet, and
- (ii) in increments of 1,000 feet above 10,000 feet;

(b) If the observed value of the base of a cloud layer or vertical visibility into an obscuring layer is between two reportable values then the lower value shall be reported;

(c) If the observed cloud amount is between two reportable values then the greater value shall be reported;

(d) Cloud base height or vertical visibility into an obscuration shall, for aerodromes, be by reference to the aerodrome elevation as published in the *Canada Flight Supplement* except when the height of the precision approach runways is 50 feet or more below aerodrome elevation in which case cloud base height or vertical visibility shall be with respect to the latter.

4.11 Instruments used for the measurement of sky condition shall:

- (a) incorporate an algorithm that is equivalent to or better than the Federal Aviation Administration standard algorithm for ceilometers or demonstrate that an alternative method performs as well or better than this algorithm;
- (b) use, as the reference elevation to compute cloud base height or vertical visibility, the aerodrome elevation as published in the *Canada Flight Supplement*;
- (c) have accuracy such that the distance to a solid target is measured to within the greater of 100 feet or 5% up to 10 000 feet with a confidence of at least 95% and
 - (i) within one reportable value of the value of the ceiling reported by a clinical human observer at least 75% of the time up to and including 900 feet and

(ii) within 2 reportable values of the value of the base of the ceiling reported by a clinical human observer at least 70% of the time from 1000 feet to 2 500 feet.

Temperature and humidity

4.12 Meteorological observations of temperature shall be accurate to within 1 degree Celsius.

4.13 Meteorological observations of dewpoint temperature shall be accurate to within 2 degrees Celsius for dewpoint temperatures ranging from -30°C to $+25^{\circ}\text{C}$.

4.14 The accuracy requirements of subsection 4.12 and 4.13 shall be demonstrated with at least a 95% confidence during laboratory testing that is traceable to a reference standard.

4.15 The temperature shall be reported to the nearest whole degree Celsius, with observed values involving 0.5 degree Celsius being rounded up to the next warmer whole degree Celsius.

ATMOSPHERIC PRESSURE (ALTIMETER SETTING)

4.16 Meteorological observations of atmospheric pressure intended to be provided as meteorological reports of altimeter setting shall meet the following requirements:

(a) The atmospheric pressure shall be measured by two or more independently-operating sensors each of which is traceable to a World Meteorological Organization primary standard barometer;

(b) The sensors shall be installed and operated in accordance with the manufacturer's specifications, or equivalent specifications developed by the service provider;

(c) the sensors shall be accurate to within 0.02 inches of mercury; and

(d) the accuracy requirement of paragraph (c) shall be demonstrated with at least a 95% confidence in laboratory testing.

4.17 The following shall apply to reports of atmospheric pressure:

(a) The calculated altimeter setting shall be;

(i) computed from the station pressure using the ICAO Standard Atmosphere and the aerodrome reference elevation in the Canada Flight Supplement, and

(ii) rounded downward to the nearest lower one hundredth inch of mercury for reporting purposes.

METEOROLOGICAL REPORTS (GENERAL)

4.18 The meteorological elements entered in a meteorological report shall, as closely as possible, reflect the conditions existing at the actual time of the meteorological observation.

4.19 The location identifier used in a meteorological report shall not be the same as that used for an aerodrome if the meteorological station is not representative of the aerodrome reference point.

4.20 Whenever an error is detected in a disseminated report, a correction shall be disseminated as soon as practical.

4.21 Any coded meteorological report intended for distribution beyond the aerodrome, shall have "AUTO" added to the coded message following the date time group and before the wind group should any of the meteorological elements of sky condition (cloud), visibility or present weather be based on automated instruments.

4.22 Any uncoded meteorological report shall specify, in plain language, if the observation of any of sky condition (cloud), visibility or present weather are based on automated instruments.

4.23 The service provider shall retain a copy of each meteorological report for at least 30 days after the report is issued.

4.24 The service provider shall provide a copy of the meteorological reports required by subsection 4.23 to the Minister upon reasonable notice given by the Minister.

AUTO METAR / SPECI FROM AUTOMATED STATION

4.25 METAR / SPECI from automated stations shall meet the following requirements:

(a) shall have "AUTO" added to the coded message following the date time group and before the wind group

(b) reports shall be provided for each UTC hour during the scheduled hours of the meteorological station;

(c) all reports shall be issued in AUTO METAR / SPECI format in accordance with Annex 3 to the Convention except as otherwise required by the *Canadian Aviation Regulations*;

(d) All reports from automated sites shall include remarks indicating the direction from the site of any reported thunderstorms or the presence of ice accretion and otherwise include remarks and supplementary information as established and documented by the service provider.

AUTO METAR / SPECI WEATHER WATCH

4.26 Each service provider providing AUTO METAR reports shall ensure that SPECI reports are issued upon changes in the weather, relative to the current report, in accordance with the following requirements;

- (a) when the mean surface wind direction has shifted by 45° or more in less than 15 minutes and the wind speed at the end of the shift is at least 10 knots;
- (b) when the two minute mean wind speed increases by 10 knots or more;
- (c) when the lesser of the vertical visibility into a totally obscuring surface based layer, or the height of the lowest broken or overcast layer aloft decreases to less than, or if below, increases to equal or exceed the following heights;
 - (i) 2 500 feet,
 - (ii) the threshold between IFR and VFR,
 - (iii) the aerodrome specific alternate minima for ceiling in accordance with the alternate weather requirements table in the *Canada Air Pilot* for Category C aircraft;
- (d) when a cloud layer aloft is observed below 1000 feet when no cloud layer was reported below that height in the report immediately previous;
- (e) when visibility decreases to less than, or if below, increases to equal or exceed:
 - (i) the no alternate IFR limit, where applicable,
 - (ii) the threshold between IFR and VFR;
 - (iii) the aerodrome specific alternate minima for visibility in accordance with the alternate weather requirements table in the *Canada Air Pilot* for Category C aircraft;
- (f) upon a change in the intensity of freezing precipitation;
- (g) when hail, freezing fog, freezing rain, rain, drizzle, freezing drizzle, snow, thunderstorms or heavy precipitation of any type begin or end;
- (i) for the onset or cessation of precipitation of at least a light intensity
- (j) for the onset or cessation of ice accretion, and
- (k) in accordance with any additional criteria as established and documented by the service provider.

(l) The service provider shall document the criteria used for the issuance of SPECI, in accordance with the applicable requirements of paragraphs (a) to (j) and make a copy available to the Minister upon reasonable request of the Minister.

5. QUALITY MANAGEMENT SYSTEM

5.1 The service provider shall establish, document, implement and maintain a quality management system comprising procedures, processes and resources necessary to provide for the quality management of the meteorological information to be supplied.

5.2 The quality management system in accordance with 5.1 shall:

- (a) verify that meteorological observations and reports comply with stated requirements including format and content,
- (b) verify that meteorological reports reflect conditions existing at the actual time of meteorological observations,
- (c) establish consistency in the time and frequency of issuance of reports;
- (d) establish and maintain operational procedural manuals and documentation,
- (e) establish and maintain station commissioning protocols,
- (f) establish and maintain station inspection frequency requirements and methods,
- (g) establish quality control and quality monitoring,
- (h) specify minimum qualifications and training requirements and set currency limitations for personnel who commission, inspect or maintain equipment,
- (i) if non-conformance is identified, ensure that action is initiated to determine and correct the cause.

5.3 The quality management system shall be audited, in accordance with the requirements of the quality management system, and all audit findings shall be evidenced and properly documented.

5.4 The documentation in accordance with subsections 5.2 and 5.3 shall be made available to the Minister upon reasonable request of the Minister.

QUALITY ASSURANCE OPTION

5.5 Notwithstanding the requirements of subsections 5.1 to 5.4 service providers, other than those who provide METAR / SPECI, may meet quality management system requirements in accordance with the alternative requirements established in subsection 5.6.

5.6 The service provider shall establish and maintain a station history at the meteorological station for each station that it operates containing:

- (a) the type of the meteorological system;
- (b) the following meteorological station information:

- (i) contact information for the service provider and the person providing maintenance services for the meteorological station;
- (ii) location using geographical coordinates and elevation;
- (iii) descriptions of remote and immediate surroundings and obstacles;
- (iv) instrument layout;
- (v) facilities including data transmissions, power supply and cabling; and
- (vi) climatological description; and

(c) the following individual instrument information:

- (i) type including manufacturer, model, serial number, and operating principles;
- (ii) performance characteristics;
- (iii) calibration data and time;
- (iv) siting and exposure including location, shielding and height above ground;
- (v) measuring or observing program;
- (vi) time of meteorological observations;
- (vii) data acquisition including sampling and averaging;
- (viii) data processing methods and algorithms;
- (ix) preventive and corrective maintenance; and
- (x) data quality;

(d) A description of the training provided to any personnel providing commissioning, inspection or maintenance services;

(e) station operation manuals used by staff providing services;

(f) a description of the minimum qualifications, training and currency limitations established by the service provider for staff providing services.