2006 Amendments to the Air Monitoring Directive, 1989 (AMD 2006)

Part I in the Monitoring and Reporting Directive Series

Effective Date: April 1, 2006

Alberta ENVIRONMENT

REPEALED - refer to 2016 Air Monitoring Directive, as amended

2006 Amendments to the Air Monitoring Directive, 1989

(AMD 2006)

PART I IN THE MONITORING AND REPORTING DIRECTIVE SERIES

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Contents

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The AMD 2006 draft document was placed on Alberta Environment's Web site to provide the opportunity for public review and to solicit suggestions for its improvement. Many stakeholders from industry, government, and airsheds contributed to the improvement of the AMD 2006 document.

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Representatives for Industry Organizations

Organization	***Representative***
Canadian Association of Petroleum Producers	*Rick Hyndman: CAPP;* *Sian Pascoe: CAPP;* *Sean Reilly: Talisman Energy;* *Sherry Sian: CAPP;* *Mike Trefry: Imperial Oil*
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Utilities	*Barb Bosh, Bob Piro: Atco Power*
Alberta Forest Products Association	*Neil Shelly: AFPA*

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Bettina Mueller, Edmonton, Alberta, January 2006

Guidance For Use

The Air Monitoring [1]Directive, 1989 (AMD 1989) and the 2006 Amendments to the Air Monitoring Directive, 1989 (AMD 2006) represent Part I of the Monitoring and Reporting Directive series, which specifies environmental monitoring and reporting requirements and guidelines.

Alberta Environment and other environmental monitoring data users rely on environmental data to do the following:

- *Assess the quality of air, land, and water,*
- *Assess trends,*
- *Determine compliance with guidelines and standards,*
- *Perform modeling for approval applications and review analysis, and*
- *Fulfill other environmental management functions.*

Hence, it is essential that environmental data submitted to Alberta Environment is consistent, of high quality, and defensible.

The Directive outlines the methods acceptable to Alberta Environment for air monitoring and reporting, as required by an Alberta Environmental Protection and Enhancement Act (EPEA) approval, Code of Practice, Registration, or any other air monitoring and reporting activities for which data is submitted to Alberta Environment (AENV), or any other person acting on its behalf.

For ease of use of the AMD 2006, requirements that must be followed are numbered and written in "clause" form in regular text. This non-italicized text is legally binding. Further explanation of and guidance regarding the requirements are also provided in italicized text. Please note that this guidance text is added to avoid misinterpretation and is not the legally binding text.

Special attention should be given to the documentation requirements for the Quality System: some requirements specify that processes and procedures be documented, whereas others require only that the processes and procedures be established and implemented. In the event that documentation is not required, the person responsible must provide evidence during an audit that the specified processes and procedures were implemented.

The level of detail and the complexity of the Quality System, the extent of documentation, and the resources devoted to it will be dependent on the size of the organization and its environmental monitoring and reporting activities. Integration of the Quality System requirements with pre-existing environmental management systems can contribute to the effective implementation of the quality system, as well as to efficiency and to clarity of roles.

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1. *Directive means the Air Monitoring Directive, 1989 (AMD 1989) and the 2006 Amendments to the Air Monitoring Directive, 1989 (AMD 2006).*

Purpose

The intent of this directive is to:

- *Outline the minimum requirements for the collection and reporting of environmental monitoring data to Alberta Environment,*
- *Establish a set of consistent requirements for Quality Assurance practices that ensure, and allow for verification of, the quality of the environmental data collected in Alberta, and ensure data comparability among monitoring sites, and*
- *Provide guidance and criteria to operators of monitoring equipment, auditors, and other Alberta Environment staff on minimum Quality Assurance requirements and environmental monitoring and reporting requirements.*

About Shall, Must, Should, and May

*This document uses the following definitions of **shall**, **must**, **should**, and **may**:*

- ***shall**, **must**: Deviation from requirements will constitute non-compliance with this Directive.*
- ***should**, **may**: The element is recommended.*

Overview of the AMD 2006

This section provides a general summary of Division I.

NOTE

This section is a summary only and is not meant to be comprehensive. For specific requirements, refer to sections 1 to 3.

Division I:

1. **Application**: *Describes who the Directive applies to and when the AMD 2006 will come into effect.*
2. **Quality System**: *Contains the core elements of a Quality System that the person responsible must establish, implement, and maintain. It discusses:*
   - *The scope of the Quality System (see section 2.1),*
   - *The time lines for implementation (see section 2.2),*
   - *The assignment of responsibilities (see section 2.3),*
   - *Documentation of the Quality System, including the collected data, and the retention times for data and documents (see section 2.4),*
   - *The requirements the person responsible must meet to monitor adherence to the Quality System, and the requirements of the Directive (see section 2.5),*
   - *The requirements the person responsible must meet for correcting non-compliance (see section 2.6),*

- *The requirements for external services and supplies that can affect the quality of the environmental monitoring data (see sections 2.7 and 2.8), and*
- *General technical requirements, for things such as personnel qualifications, monitoring equipment, and methodology (see section 2.9).*

3. **Reporting Requirements***: Describes the requirements for reporting data and information (see section 3.1).*

Data Confidentiality

All environmental data submitted to AENV are subject to Alberta's Freedom of Information and Protection of Privacy Act (FOIP) requirements.

Data confidentiality is also addressed in EPEA Section 35, Disclosure of Information, which regulates the disclosure and publication of information.

Parties conducting environmental monitoring activities are encouraged to work with interested stakeholders (for example, the surrounding community) to ensure the timely sharing of requested environmental monitoring data, and to proactively make environmental monitoring data available (for example, in a community newsletter or on internet pages).

Review Process for the MRD

Comments and suggestions for the improvement of the Directive are welcome, and should be directed in writing to:

Alberta Environment
Re: Monitoring and Reporting Directives
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A stakeholder group consisting of representatives from Alberta Environment, industry, airsheds, and other organizations involved with environmental monitoring activities will review and update the Directive on a regular basis.

This group will meet at a minimum three-year frequency to review, discuss comments and suggestions, and update the Directive as required, unless circumstances dictate more frequent updating.

A draft containing the amendments will be posted on the Alberta Environment Monitoring and Reporting Directive Web site (www3.gov.ab.ca/env/air) for public comment for a period of two months.

0.0 Amendments to the Air Monitoring Directive, 1989 (AMD 1989)

0.1 The Air Monitoring Directive, 1989 Alberta Environment is hereby amended as follows:

0.1.1 Section I Introduction of the AMD 1989 is repealed and replaced with the following Division 1 of the AMD 2006.

0.1.2 Section II D 1. General of the AMD 1989 is repealed.

0.1.3 Section II D 2. Record Keeping of the AMD 1989 is repealed.

0.1.4 Section III B 4. CEM Results of the AMD 1989 is repealed.

Division I
1.0 Application

*The clauses under **1.0 Application** describe who the Directive applies to and indicate when the AMD 2006 will come into effect.*

1.1 General

1.1.1 The requirements of the Directive apply to all environmental air monitoring data that are:

(a) Required by an EPEA Approval, Code of Practice, Registration, or other legal instrument, or

(b) Submitted to Alberta Environment or anyone else acting on its behalf.

1.1.2 The person responsible shall conduct all environmental monitoring and reporting in accordance with the requirements of this Directive.

1.1.3 The AMD 2006 comes into effect on April 1, 2006.

2.0 Quality System

*The clauses under **2.0 Quality System** contain the core elements of a Quality System that the person responsible must establish, implement, and maintain.*

Quality Assurance and Quality Control

The clauses under 2.0 Quality Systems (following) outline the requirements for Quality Assurance and Quality Control associated with environmental monitoring and reporting activities, and the data that are submitted to Alberta Environment, or to anyone else acting on its behalf.

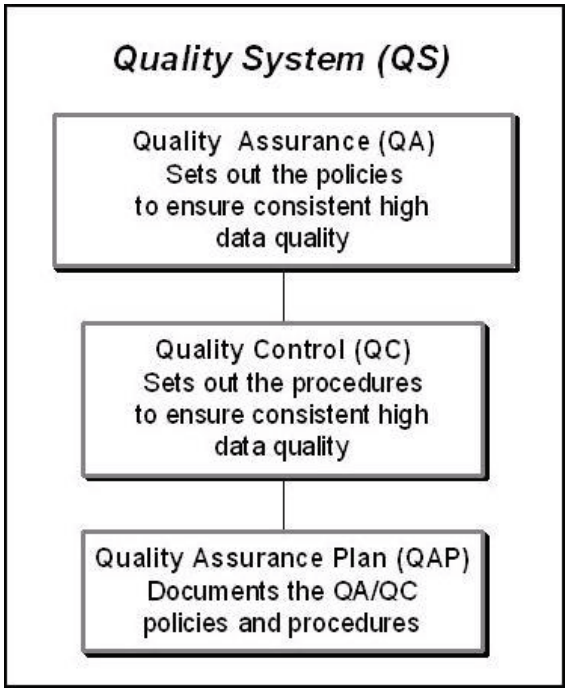
The Quality Systems approach taken in this Directive is modeled after existing environmental management systems (for example, ISO 14001) so as to not interfere with environmental management systems that organizations have already implemented. Although there are many similarities, some requirements do differ. This Directive applies only to the environmental monitoring and reporting aspect of an operation and is, therefore, more limited in overall scope yet, owing to the technical nature of some of the requirements, in some ways, more specific.

Quality Systems comprise the Quality Assurance policies (QA; high level) and Quality Control procedures (QC; working level) that are outlined in a Quality Assurance Plan (QAP). The plan must be followed to ensure and document the quality of the environmental data being collected and reported.

Establishing and implementing the Quality System ensures that the environmental monitoring and reporting procedures are verified and documented, so that uncertainties in the reported data can be controlled and quantified.

The intent of this Directive is to establish performance objectives while allowing the parties who conduct environmental monitoring and reporting to determine how to best meet the objectives set out in this Directive.

The Quality System requirements allow for a scaling of the Quality System so that a system can be established that is appropriate to the type, range, and volume of environmental monitoring and reporting activities undertaken.



The Quality System (QS)

The Quality Assurance Plan documents how the person responsible intends to meet the performance objectives of this Directive.

2.1 Application of the Quality System

2.1.1 The Quality System requirements apply to those environmental monitoring and reporting processes, procedures, events, objects, and individuals that affect, or may affect, the quality of the environmental data submitted to AENV.

NOTE

The Quality System requirements of this Directive address environmental monitoring and reporting activities. Alberta Environment's Laboratory Data Quality Assurance Policy specifically addresses the quality of laboratory data. This policy can be viewed at:

http://www3.gov.ab.ca/env/protenf/standards/labdata.html

2.2 Implementation

2.2.1 The person responsible shall establish a comprehensive Quality System (QS) by April 1, 2007 in accordance with the requirements of this Directive.

2.2.2 The person responsible shall implement the QS by April 1, 2008.

2.2.3 The Quality System required by clause 2.2.1 shall include a Quality Assurance Plan (QAP) that documents the Quality System's policies and procedures in accordance with the requirements set out in this Directive.

2.2.4 The person responsible shall maintain the Quality System at all times.

NOTE

Although some processes and procedures of the Quality System must be documented, other procedures and processes must be established and implemented, but not documented.

Wherever a requirement for documentation of a process or procedure is not specified, the person responsible must be able to demonstrate during an audit that the process or procedure is in place.

2.3 Administrative Requirements

Organization

2.3.1 The person responsible shall provide resources essential to establishing, implementing, and maintaining the Quality System, and to the environmental monitoring and reporting activities.

NOTE

These resources include human, financial, and technological resources.

2.3.2 The person responsible shall

(a) Identify personnel, and

(b) Define and document the responsibilities of personnel that have involvement with any of the following:

(i) The establishment, implementation, and maintenance of the Quality System.

(ii) Any environmental monitoring and reporting activities.

2.4 Document Control

General

2.4.1 The person responsible shall (a) establish, (b) implement, and (c) maintain procedures to control all documents that form part of its Quality System (internally generated or from external sources), so that documents:

(i) Can be located,

(ii) Are reviewed,

(iii) Are revised, and

(iv) Are approved for use by authorized personnel prior to issue.

2.4.2 Current editions of relevant documents shall be available at all locations where operations essential to the functioning of the environmental monitoring and reporting activities are performed.

2.4.3 The person responsible shall communicate and make available the relevant Quality System documentation to the personnel identified pursuant to clause 2.3.2.

Document Changes

2.4.4 The person responsible shall (a) establish, (b) implement, and (c) maintain procedures with regard to creation and modification of documents.

Control of Records

2.4.5 The person responsible shall (a) establish, (b) implement, and (c) maintain procedures for the identification and maintenance of records related to environmental monitoring and reporting and maintenance activities.

2.4.6 The person responsible shall establish and maintain records that:

(a) Are traceable to the environmental monitoring, reporting and maintenance activities, and

(b) Demonstrate compliance with this Directive.

2.4.7 The person responsible shall maintain records of the results of reviews and internal audits.

2.4.8 The person responsible shall retain all the records referred to in clauses 2.4.5, 2.4.6, and 2.4.7 for a minimum of three years unless otherwise specified in this Directive.

2.4.9 The person responsible shall have a plan for record maintenance or transfer in the event that ownership is transferred or the person responsible goes out of business.

Control of Data

2.4.10 The person responsible shall (a) establish, (b) implement, and (c) maintain documented procedures that verify that the reported data are free from error.

2.4.11 The person responsible shall establish documented procedures for determining the validity of the data treatment undertaken.

2.4.12 The person responsible shall (a) establish, (b) implement, and (c) maintain procedures for the development of data acceptance and/or rejection criteria where no method or regulatory criteria are specified in this Directive.

2.4.13 When computers, automated equipment, or microprocessors are used for the acquisition, processing, recording, reporting, storage, or retrieval of environmental monitoring or calibration data, the person responsible shall:

(a) Document and validate computer software developed by the person responsible,

(b) Establish and implement procedures for protecting the environmental data, and

(c) Establish and implement procedures for maintaining and securing data, including the prevention of unauthorized access to, and the unauthorized amendment of, computer records.

NOTE

Commercial off-the-shelf software (for example, word processing, database, and statistical programs) in general use within their designed application range is considered to be sufficiently validated. However, the person responsible must validate software configurations or modifications as stated in clause 2.4.13(a).

2.4.14 The person responsible shall retain all raw data for a minimum of three years.

2.4.15 The person responsible shall retain a copy of final reports for a minimum of ten years.

NOTE

The time for raw data retention is set to allow for a full internal or external audit of the data.

2.5 Internal Audits

2.5.1 The person responsible shall conduct internal audits of its environmental monitoring and reporting activities to verify that its operations continue to comply with the requirements of its Quality System and this Directive.

2.5.2 The internal audits required under clause 2.5.1 shall be conducted in accordance with a predetermined schedule and procedure and take place at a minimum of every three years.

2.5.3 The internal audit shall address all elements of the Quality System as it relates to the environmental monitoring and reporting activities conducted by the person responsible.

2.5.4 All internal audits shall be carried out by trained and qualified personnel who are, wherever resources permit, independent of the activity to be audited.

NOTE

It is strongly recommended that the auditor is independent of the activity to be audited. Only under exceptional circumstances (for example, where the financial situation of a small operation does not allow for the hiring of a third-party auditor) should personnel involved in the activity to be audited be considered for conducting the internal audit.

2.5.5 When findings of non-compliance with this Directive or the person responsible's own Quality System are identified during the internal audit, the person responsible shall take corrective action in accordance with section 2.6.

2.5.6 The person responsible shall record:

(a) The area of activity audited pursuant to clause 2.5.1,

(b) The internal audit findings, and

(c) Corrective actions that arise from them.

2.5.7 The person responsible shall conduct follow-up audit activities as soon as practicable, to verify and record the implementation and effectiveness of the corrective action taken pursuant to clause 2.5.5.

2.5.8 The person responsible shall conduct a management review of the audit results to address the possible need for changes to the Quality System and its policies and procedures, in light of internal audit results or changing circumstances.

2.5.9 The management review of audit results shall be documented by the person responsible.

2.6 Non-Compliance, Preventative, and Corrective Action

2.6.1 When any aspect of its environmental monitoring and/or reporting activities, or the results of these activities, do not comply with the requirements of this Directive or its own procedures, the person responsible shall identify and document the personnel responsible for the following:

(a) Handling and investigating non-compliances,

(b) Taking mitigative action, and

(c) Initiating and completing corrective and preventative action.

2.6.2 The person responsible shall (a) establish, (b) implement, and (c) maintain documented procedures for non-compliance, and for preventative and corrective action with regard to this Directive that require that:

(i) Corrective action is taken immediately,

(ii) The significance of any non-compliance with this Directive be evaluated,

(iii) Corrective and preventative action be taken to eliminate the causes for actual and potential non-compliance that is appropriate to the magnitude of the problem,

(iv) Where required by regulation or the law, the appropriate Government of Alberta Department is notified,

(v) Where required by Alberta Environment, corrected data are provided to Alberta Environment or anyone acting on behalf of Alberta Environment, and

(vi) Any required changes to documented procedures resulting from corrective and preventative action are implemented.

2.7 Subcontracting of Environmental Monitoring and/or Reporting

2.7.1 The person responsible shall maintain a record of all subcontractors performing environmental monitoring and reporting or maintenance activities on behalf of the person responsible.

NOTE

It is the responsibility of the person responsible to ensure that the environmental monitoring and reporting work is placed with a subcontractor that is capable of meeting the requirements of this Directive.

2.8 Purchasing of Services and Supplies

2.8.1 The person responsible shall (a) establish, (b) implement, and (c) maintain procedures for the selection and purchasing of the services and supplies it uses that affect or may affect the quality of the environmental monitoring.

2.8.2 The person responsible shall (a) establish, (b) implement, and (c) maintain procedures to verify that purchased supplies, reagents, and consumable materials that affect or may affect the quality of environmental monitoring

comply with specifications or requirements defined in the environmental monitoring and analysis method(s) for the environmental monitoring required by Alberta Environment.

2.8.3 The person responsible shall establish and maintain records of the verification required by clause 2.8.2(b).

2.9 Technical Requirements

Personnel

2.9.1 Personnel performing tasks that are related to environmental monitoring and reporting activities shall be competent on the basis of appropriate education, training, and/or experience.

2.9.2 The person responsible shall:

(a) Identify training needs,

(b) Provide training for personnel, and

(c) Ensure that the training of personnel is kept up-to-date.

2.9.3 Staff in training shall be supervised by qualified staff.

2.9.4 The person responsible shall (a) establish, (b) implement, and (c) maintain procedures to make all personnel identified under clause 2.3.2 aware of all of the following:

(i) The importance of compliance with the requirements of this Directive,

(ii) Their roles and responsibilities in achieving compliance with the Directive, and

(iii) The potential consequences for departure from specified procedures.

2.9.5 The person responsible shall:

(a) Maintain records of the relevant authorization(s), including the date(s) on which authorization and/or competence was confirmed for personnel identified in clause 2.3.2,

(b) Maintain records of the competence, educational and professional qualifications, training, skills, and experience of all personnel identified under clause 2.3.2, and

(c) Provide a record of the competence, educational and professional qualifications, training, skills, and experience of contracted personnel to the Director within 5 working days of the request.

NOTE

An example of the type of authorization intended in clause 2.9.5 is authorization to run and/or maintain specific equipment, based on demonstrated competence.

This demonstration of competence can be an internal company process, unless external qualification and/or training requirements exist. Some discretion is left to the auditor in deciding if the demonstration is adequate (for example, depending on the complexity of the procedure or equipment, completing a course or in-service may be adequate, whereas handing over the equipment manual without further instruction may not be adequate).

Physical Location and Conditions

2.9.6 The person responsible shall physically locate all environmental monitoring equipment at locations and in conditions that meet or exceed the operation requirements for the particular environmental monitoring equipment.

2.9.7 The person responsible shall maintain a record of the technical requirements for the physical locations and conditions that can affect the results of environmental monitoring.

2.9.8 The person responsible shall (a) monitor, (b) control, and (c) record environmental conditions as required by the relevant specifications, methods, and procedures, or where they influence the quality of the results.

Equipment

2.9.9 The person responsible shall use the sampling, measurement, test, and support equipment required for the correct performance of the environmental monitoring and/or calibrations.

NOTE

In cases where the person responsible needs to use equipment outside its permanent control, it must ensure that the requirements of this Directive are met.

2.9.10 The person responsible shall only use equipment and software for environmental monitoring or calibration that meets or exceeds the performance specifications set out in this Directive.

2.9.11 All environmental monitoring equipment shall be operated and maintained by the person responsible in accordance with the environmental monitoring methods set out in this Directive.

2.9.12 If specific operation and maintenance requirements are not stipulated in this Directive, the person responsible shall follow the equipment manufacturer's operation and maintenance instructions.

2.9.13 The person responsible shall (a) establish, (b) implement, and (c) maintain documented procedures for:

- **(i)** The operation and maintenance of all relevant environmental monitoring equipment, and
- **(ii)** The collection, handling, and preparation of samples, where the absence of such instructions could adversely affect the quality of the results of environmental monitoring and reporting.

2.9.14 The person responsible shall safeguard all environmental monitoring equipment from tampering and/or adjustments that could invalidate the environmental monitoring results.

2.9.15 The person responsible shall maintain and have available at or near the environmental monitoring location, records of each major item of equipment and its software that is integral to the environmental monitoring activities performed at that location.

2.9.16 The records in clause 2.9.15 shall include, at a minimum, all of the following:

- **(a)** The manufacturer's name, equipment type identification, and serial number or other unique identification,
- **(b)** Confirmation that the equipment complies with the required performance specification,
- **(c)** The manufacturer's instructions, or reference to the location of the instructions,
- **(d)** Dates, results, and copies of reports and certificates of all calibrations, adjustments, and acceptance criteria, and the due date of the next calibration,
- **(e)** The maintenance plan, and a record of all maintenance carried out to date,
- **(f)** Documentation of all routine and non-routine maintenance activities, and reference material verifications,
- **(g)** A record of any damage, malfunction, modification, or repair to the equipment, and

(h) A record of the date the equipment was placed in service.

2.9.17 The person responsible shall not use environmental monitoring equipment that is defective or operating outside specified limits until it has been repaired and shown by calibration or test to perform within acceptable limits.

2.9.18 The person responsible shall examine the effect of the defect or departure from specified limits on the previous environmental monitoring and/or calibrations, and shall institute the "Non-compliance, preventative, and corrective action" procedure pursuant to section 2.6.

Environmental Monitoring Methods

2.9.19 The person responsible shall use the applicable environmental monitoring methods specified in this Directive, as amended or replaced, for all environmental monitoring and reporting activities required by an EPEA approval, Code of Practice, Registration, or other legal instrument, unless otherwise required in writing by the Director.

2.9.20 The person responsible shall (a) establish, (b) maintain, and (c) implement documented procedures that accurately reflect all phases of current environmental monitoring activities.

NOTE

The phases referred to in clause 2.9.20 include, for example, assessing data integrity and taking corrective action.

2.9.21 When necessary, the person responsible shall supplement the environmental monitoring methods specified in this Directive with additional details to ensure consistent and correct application.

NOTE

In the event that a monitoring method is applied under unusual circumstances that were not foreseen in the monitoring method specified in the Directive, and that require additional specifications to ensure consistent application, the method must be supplemented with those additional specifications.

2.9.22 The person responsible shall confirm that it can properly use a specified monitoring method before conducting the related environmental monitoring activities. A demonstration of capability shall be completed and documented:

(a) Initially, and

(b) Each time there is a change in instrument type, personnel, or method.

2.9.23 The person responsible shall not deviate from specified environmental monitoring methods unless the deviation has been documented, technically justified, and authorized in writing by the Director.

2.9.24 The person responsible shall document the environmental monitoring methods and associated procedures used in its QAP.

2.9.25 The documentation required includes all of the following, where applicable, for each environmental monitoring method:

(a) A description,

(b) A reference to the authority,
(c) An applicable matrix or matrices,
(d) The detection limit,
(e) The scope and application, including the components to be analyzed,
(f) Definitions,
(g) Interferences,
(h) The equipment and supplies required,
(i) The linear range,
(j) Reagents and standards,
(k) Sample collection, preservation, shipment, and storage procedures,
(l) Quality Control procedures,
(m) Calibration and standardization procedures,
(n) Calculation procedures,
(o) Data assessment and acceptance criteria for Quality Control measures,
(p) Corrective actions for out-of-control data,
(q) References, and
(r) Any tables, diagrams, flowcharts, and validation data.

Methods Requiring Validation and AENV Authorization

2.9.26 In the event that an environmental monitoring method is not specified in this Directive for a given environmental monitoring activity, the person responsible shall use an environmental monitoring method that has been validated in accordance with clauses 2.9.28 to 2.9.31 inclusive, and has been authorized in writing by the Director.

2.9.27 The person responsible shall provide a clear specification of the purpose for the environmental monitoring method to the Director in order to apply for the written authorization referred to in clause 2.9.26.

NOTE

The person responsible should select appropriate methods that, preferably, have been published in either national or international standards, by reputable technical organizations, or in relevant scientific texts or journals, or as specified by the manufacturer of the equipment.

Methods developed, or methods adapted by the person responsible, may also be used if they are appropriate for the intended use, are validated using AENV accepted validation protocols, and have received authorization from AENV.

Method Validation

2.9.28 The person responsible shall validate all non-standard methods, standard methods used outside their intended scope, and amplifications or modifications of standard methods to confirm that the methods are suitable for the intended use.

2.9.29 Method validation shall be performed in accordance with validation protocols specified in this Directive.

2.9.30 In the absence of applicable validation protocols, the person responsible must propose a validation protocol to Alberta Environment, which must be authorized in writing by the Director prior to implementation.

2.9.31 The person responsible shall record (a) the results obtained from the validation, (b) the procedure used for the validation, and (c) a statement that indicates whether the method is suitable for the intended use.

NOTE

The range and accuracy of the values obtainable from validated methods, as assessed for the intended use, must be relevant to the environmental monitoring needs.

Estimation of Uncertainty of Measurement

NOTE

Estimation of uncertainty has to be considered during the air monitoring planning process, in order to determine if the data obtained provide the appropriate answers to the questions raised. When estimating the uncertainty of measurement, all uncertainty components that are of importance in the given situation must be taken into account.

2.9.32 The person responsible shall (a) establish, (b) implement, and (c) maintain documented procedures for estimating uncertainty of measurement.

2.9.33 In cases where the method precludes rigorous, metrological, or statistically valid calculation of uncertainty of measurement, the person responsible shall, at a minimum:

(a) Identify all the components of uncertainty,

(b) Make a reasonable estimation of each component, and

(c) Select a reporting format for the result that clearly describes the uncertainty.

NOTE

In cases where the relevant environmental monitoring method specifies limits to the values of the major sources of uncertainty of measurement, and specifies the form of presentation of calculated results, the person responsible is considered to have satisfied clauses 2.9.32 and 2.9.33 by following the relevant monitoring method and reporting procedures.

Calibration

2.9.34 The person responsible shall calibrate all equipment used for environmental monitoring before it is put into service and at regular intervals:

(a) As set out in this Directive, or

(b) In the absence of specifications in this Directive, as required in the manufacturers manual.

NOTE

The calibration interval length may vary depending on the equipment used. Equipment-specific calibration requirements can be found in Division II of this Directive.

2.9.35 The person responsible shall (a) establish, (b) implement, and (c) maintain a program and documented procedures for the calibration of the environmental monitoring equipment.

2.9.36 If specific calibration requirements are included in a required environmental monitoring method, the person responsible shall meet those requirements.

2.9.37 Equipment used for subsidiary measurements having a significant effect on the accuracy or validity of the result of the environmental sampling shall be calibrated before being put into service.

2.9.38 Equipment used for subsidiary measurements having a significant effect on the accuracy or validity of the result of the environmental sampling shall be calibrated on a continuing basis.

NOTE

Subsidiary measurements include, for example, measurements for environmental conditions.

2.9.39 Where calibrations give rise to a set of correction factors, the person responsible shall (a) establish, (b) maintain, and (c) implement documented procedures for use of the correction factors and updating of calibration and data records.

NOTE

Initial instrument calibration is used directly for quantification; continuing instrument calibration verification is used to confirm the continued validity of the initial calibration unless otherwise required by a calibration method.

2.9.40 For each initial equipment calibration, the person responsible shall:

(a) Record the details of the initial instrument calibration, including calculations, integrations, acceptance criteria, and associated statistics,

(b) Retain the referenced material and have the references available for review upon request, when initial instrument calibration procedures are referenced in an environmental monitoring method,

(c) Retain raw data for a minimum of three years,

(d) Quantify sample results from the initial instrument calibration, and not from any continuing instrument calibration verification unless otherwise required by the specified monitoring method,

(e) Establish criteria for the acceptance of an initial instrument calibration, where criteria are not specified in this Directive,

(f) Consider the results of samples that fall outside of the range established by the initial calibration invalid, and report the results with defined qualifiers or data flags, and

(g) Perform corrective action if the initial instrument calibration results are outside established acceptance criteria, by doing one of the following:

(i) Reanalyzing all associated samples, or collecting new samples, or

(ii) If reanalysis of the samples or collection of new samples is not possible, considering data associated with an unacceptable initial instrument calibration invalid and reporting the data with appropriate data qualifiers.

2.9.41 If the required environmental monitoring or calibration method does not specify the number of calibration standards, the minimum number shall be two, not including blanks or a zero standard.

2.9.42 At a minimum, one calibration standard shall be near the lowest quantification limit.

2.9.43 Clause 2.9.41 does not apply to equipment technology for which it has been established by Alberta Environment accepted methodologies and procedures, that a zero and a single point standard are appropriate for calibration.

2.9.44 When intermediate calibration checks are needed to maintain confidence in the calibration status of the equipment, these checks shall be carried out in accordance with a documented procedure.

Calibration Records

2.9.45 Calibration records shall include, at a minimum, all of the following:

(a) The equipment identifier (for example, a serial number), and the date and time of calibration,

(b) The calibration method used,

(c) The environmental and other conditions under which the calibrations were made that could have an influence on the measurement results,

(d) The uncertainty of measurement,

(e) A statement of compliance with an identified metrological specification or clauses thereof, and

(f) Evidence that the measurements are traceable.

2.9.46 The person responsible shall report the uncertainty of measurement when determining and reporting compliance with the applicable calibration acceptance criteria.

2.9.47 When environmental monitoring equipment has been adjusted or repaired, the person responsible shall record the calibration results before and after adjustment or repair.

2.9.48 When a calibration has been subcontracted, the person responsible shall require a calibration report from any subcontractor performing the calibration work.

Sampling Plans and Procedures

2.9.49 The following clauses apply to situations where (a) routine monitoring is initially established, (b) routine monitoring is modified, or (c) non-routine environmental monitoring is used, such as special studies, investigations, or confirmation of modelling results.

2.9.50 The person responsible shall (a) establish, (b) implement, and (c) maintain documented sampling plans and procedures for environmental monitoring.

2.9.51 Sampling plans and procedures shall be authorized in writing by the Director, unless otherwise authorized in writing by the Director.

2.9.52 The person responsible shall, at a minimum, include the following principles in the sampling plan and procedures for any given environmental monitoring and reporting activity, as applicable:

- **(a)** Tests to define the variability and/or repeatability of the environmental monitoring results,
- **(b)** Measures to assure the accuracy of the method, including calibration and/or continuing calibrations, use of certified reference materials, proficiency test samples, or other measures,
- **(c)** Measures to evaluate method capability, such as measurement uncertainty, detection limits, and quantification limits, or range of applicability such as linearity,
- **(d)** Selection of appropriate formulae to reduce raw data to final results, such as regression analysis, comparison to internal/external standard calculations, and statistical analyses,
- **(e)** Positive and negative controls to monitor tests such as blanks, spikes, or reference toxicants,
- **(f)** Selection and use of reagents and standards of appropriate quality, and use of consumables before their expiry dates,
- **(g)** Measures to assure the selectivity of the method for its intended purpose,
- **(h)** Measures to assure constant and consistent test conditions (both instrumental and environmental) where required by the method, such as temperature, relative humidity, light, or specific instrument conditions, and
- **(i)** Sampling plans and procedures shall address the factors to be controlled to ensure the validity of the environmental sampling results.

2.9.53 The person responsible shall (a) establish, (b) implement, and (c) maintain procedures for recording relevant data and operations relating to sample collection.

2.9.54 The sampling records in clause 2.9.53 shall include, at a minimum, all of the following:

- **(a)** The sampling procedure used,
- **(b)** The identification of the environmental monitoring equipment used,
- **(c)** Relevant environmental conditions at the time of sample collection,
- **(d)** Diagrams or other equivalent means to identify the sampling location, and
- **(e)** The statistics upon which the sampling procedures are based, as applicable.

2.9.55 Where deviations, additions, or exclusions from the documented sampling procedure or sampling plan are required, the person responsible shall:

- **(a)** Record deviations, additions, or exclusions with the appropriate sampling data,
- **(b)** Include deviations, additions, or exclusions in all documents containing the environmental monitoring results, and

(c) Communicate deviations, additions, or exclusions to the appropriate personnel.

Sample Handling

2.9.56 The person responsible shall (a) establish, (b) implement, and (c) maintain documented procedures for sample handling that protect the integrity and identity of the sample.

Sample Acceptance Procedure

2.9.57 The person responsible shall (a) establish, (b) implement, and (c) maintain a documented sample acceptance procedure that outlines the circumstances and criteria under which samples are accepted or rejected.

2.9.58 The sample acceptance procedure shall outline circumstances and criteria, in accordance with the manufacturer's directions for the specific environmental monitoring equipment, or environmental monitoring method, and with this Directive.

2.9.59 The person responsible shall (a) assess, (b) evaluate, and (c) document the Quality Control measures on an on-going basis.

3.0 Reporting Requirements

The following sections outline general reporting requirements for regular reporting of environmental monitoring data and reports. Details about the reporting format for air monitoring are provided in this section.

3.1 Regular Reporting

3.1.1 The person responsible shall submit reports to Alberta Environment by the time specified in the EPEA approval, Code of Practice, Registration, or as required in writing by the Director.

3.1.2 All persons who have to submit reports to Alberta Environment or anyone else acting on Alberta Environment's behalf, other than pursuant to an EPEA approval, Code of Practice, or Registration, are required to submit monthly reports by the end of the month following the month during which the data was collected, unless otherwise authorized in writing by the Director.

Reporting of Data and Results

3.1.3 The person responsible for environmental monitoring shall report to Alberta Environment or anyone acting on its behalf accurately, clearly, and validly, unless flagged in accordance with clause 3.1.5, and in accordance with this Directive.

3.1.4 Data shall be reported as valid only if all required Quality Assurance and Quality Control requirements have been met.

3.1.5 Data not meeting the stated QA/QC requirements shall be reported with clearly identifiable data flags in accordance with the requirements of this Directive.

3.1.6 The person responsible shall report the environmental monitoring results to Alberta Environment in a written monitoring report, or in electronic format where enabled by Alberta Environment or anyone acting on its behalf.

NOTE

If data or reports are sent in electronic format, the electronic files must be sent on one or more CDs via mail, until a formalized mechanism exists to confirm receipt of electronically transferred data and reports. Electronic reports that contain data that cannot be manipulated, such as PDF files, must be accompanied by the data in a form that can be manipulated, such as in an Excel spreadsheet, to allow for further data analysis.

Content of Environmental Monitoring Reports

3.1.7 Unless otherwise specified in this Directive, the person responsible shall, at a minimum, include in each environmental monitoring report all of the following information:

(a) The name and address of the person responsible,

(b) The location where the environmental monitoring activities reported were carried out, if different from the address of the person responsible,

(c) A unique identifier of the environmental monitoring report, such as the approval number and date, or another unique identifier where no approval number exists,

(d) Identification on each page of the report to ensure that the page is recognized as part of the environmental monitoring report, and clear identification of the end of the report,

(e) Identification of the environmental monitoring method(s) used,

(f) A description of the condition of, and unambiguous identification of, the sample(s), if applicable,

(g) The date and time of sample collection,

(h) The date of analysis of the sample(s), if applicable,

(i) The time of sample preparation and/or analysis, if the required holding time for either activity is less than or equal to 72 hours,

(j) Reference to the sampling plan and procedures used by the person responsible for the sampling,

(k) Diagrams, sketches, or photographs of the sampling location,

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NOTE

Where there are no changes to the sampling location, diagrams, sketches, or photographs of the sampling location need only be included in the first report.

(l) Details of any environmental conditions during sampling that may affect the interpretation of the sampling results,

(m) The environmental monitoring results, with the units of measurement and any QA/QC failures or invalid data identified,

(n) Identification of the basis on which the data are calculated,

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NOTE

This could, for example, be on a dry weight or wet weight basis.

(o) The data value, in the same units as the units stipulated in the EPEA approval, Code of Practice or Registration, or, if not specified, as required in the environmental monitoring method specified in this Directive, or as otherwise required by the Director,

(p) The name(s), function(s), and signature(s) or equivalent electronic identification of the person(s) authorizing the environmental monitoring report, and the date of issue,

(q) An interpretation of the environmental monitoring results, including comparison to applicable standards, guidelines, and limits, and a provision of trends if applicable,

(r) A statement of compliance and/or non-compliance with requirements and/or specifications where applicable,

(s) A statement about the estimated uncertainty of measurement,

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NOTE

Information about uncertainty is required in environmental monitoring reports when it is relevant to the validity or application of the test results, or when the uncertainty affects compliance with a limit.

(t) Deviations from, additions to, or exclusions from the method,

(u) Any non-standard conditions that may have affected the quality of the results, including the use and definitions of data qualifiers,

(v) Clear identification of numerical results for values outside quantification limits,

(w) Any additional information that may be required by a specific method or reporting requirement, and

(x) Any other information requested in writing by the Director.

3.1.8 In the event that a specified reporting format does not require inclusion of all items listed in clause 3.1.7, the person responsible shall, at a minimum, retain all the required information relevant for interpretation of environmental monitoring data.

Environmental Monitoring Results Obtained from Subcontractors

3.1.9 When a person responsible subcontracts environmental monitoring and/or reporting, the subcontractor(s) performing the subcontracted work shall be specified in the environmental monitoring report.

Format of Reports

3.1.10 The person responsible shall use the applicable environmental monitoring report formats specified in this Directive, unless otherwise authorized in writing by the Director.

NOTE

In the event that no suitable format is included in this Directive, the person responsible should design the format to accommodate the type of environmental monitoring carried out.

Amendments to Environmental Monitoring Results

3.1.11 Amendments to an environmental monitoring report after submission to Alberta Environment or anyone acting on behalf of Alberta Environment, shall only be made after consultation with and approval by Alberta Environment or anyone else acting on behalf of Alberta Environment, in the form of a further document or data transfer.

3.1.12 Any amendments shall:

(a) Meet all the requirements of this Directive, and

(b) Be in writing or in electronic format.

3.1.13 When it is necessary to submit a corrected environmental monitoring report, the corrected report shall be uniquely identified and contain a reference to the original report that it corrects.

Submissions of Environmental Monitoring Data and Reports

3.1.14 In the case of submission of environmental monitoring reports or data by facsimile, e-mail, or electronic media submission, the requirements of this Directive shall be met.

Environmental monitoring reports and data can be mailed or faxed to:

Director
Environmental Assurance
Environmental Monitoring and Evaluation Branch
Alberta Environment
11th floor, Oxbridge Place
9820 - 106th Street
Edmonton, AB
T5K 2J6
Facsimile: (780) 427-7958
E-mail: air.report@gov.ab.ca

3.1.15 Continuous emission monitoring system (CEMS) data shall be submitted to Alberta Environment electronically, effective April 1, 2007, in accordance with the procedures specified by Alberta Environment.

NOTE

For detail CEMS data reporting instructions, see the CEMS Reporting User Manual available at

http://www3.gov.ab.ca/env/air

Appendix A

The following definitions apply to the Directive unless otherwise stated.

Definitions

Accuracy
The degree of agreement between a measured value and the true, expected or accepted value. This is expressed as the difference between the measurement and a reference method value, which is assumed to be the equivalent of the true value.

Act
The Environmental Protection and Enhancement Act (EPEA).

Calibration
Calibration provides the relationship between the concentration of a standard (for example, a certified test gas) and the output signal of the instrument to be calibrated.

Data
Facts, figures, and values obtained by making observations, measurements, and estimations of a thing or an event, systematically.

Defensible
The ability to withstand any reasonable challenge related to the veracity or integrity of environmental monitoring and reporting records, and derived data.

Directive
The Air Monitoring Directive, 1989 (AMD 1989) and the 2006 Amendments to the Air Monitoring Directive, 1989 (AMD 2006).

Director
An employee of the Government of Alberta, designated as a Director under the Act.

Document (adj.)
The written requirements of the Quality System.

Document (v.)
To furnish documentary evidence of.

Environmental Data
Any measurements or information that describes environmental processes, location, or conditions; ecological or health effects and consequences; or the performance of environmental technology. Environmental data include information collected directly from measurements, produced from models, and compiled from other sources, such as databases or the literature.

EPEA
The Environmental Protection and Enhancement Act.

Initial Instrument Calibration
Initial calibration, generally a multipoint calibration. (Ongoing calibration is daily zero-span calibration).

Person Responsible
(a) The owner of a facility that is the subject of an approval or registration under the Environmental Protection and Enhancement Act; (b) The holder of an approval or registration under the Environmental Protection and Enhancement Act; and (c) Any other person required to report to Alberta Environment, a Director, or other designate, pursuant to the Environmental Protection and Enhancement Act.

Precision
Variation about the mean of repeated measurements of the same pollutant concentration, expressed as one standard deviation about the mean.

Quality Assurance
An integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement, to ensure that a process, item, or service is of the type and quality needed and expected.

Quality Assurance Plan (QAP)
A plan that documents the Quality Assurance/Quality Control policies and procedures.

Quality Control
The overall system of technical activities that measure the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established; operational techniques and activities that are used to fulfill requirements for quality.

Quality System
A structured and documented system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization, or ensuring quality in its work processes, products (items), and services. The Quality System provides the framework for planning, implementing, documenting, and assessing work performed by the organization and for carrying out required Quality Assurance and Quality Control.

Raw Data
The original, unmanipulated value obtained from an instrument or analysis.

NOTE

For continuous analyzers, *original unmanipulated value* means the value obtained after conversion of the voltage to a concentration.

Record
The written evidence that can be used to assess whether the requirements of the Directive have been fulfilled.

Sample
(a) A single item or specimen from a larger whole or group, such as any single sample of any medium (for example: air, water, soil); or (b) A group of samples from a statistical population whose properties are studied to gain information about the whole.

Sampling
The process of obtaining a subset of measurements from a population.

Support Equipment
Devices that are not the actual monitoring instrument, but are necessary to support monitoring and reporting operations.

Valid Data
Data of known and documented quality that satisfy, at a minimum, the requirements set out in this Directive.

Validation
The confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled.

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