



Air Monitoring Directive Chapter 1: Introduction

Version December 10, 2019
Amends the original Air Monitoring Directive published June, 1989



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1.0 Purpose

Alberta's Air Monitoring Directive (AMD) sets out the requirements for monitoring and reporting air quality in the province of Alberta. This version, referred to as the 2016 AMD, amends and takes the place of the original Air Monitoring Directive (Alberta Environment 1989), referred to as the 1989 AMD, and the 2006 Amendments to the Air Monitoring Directive, 1989 (Alberta Environment 2006), referred to as the 2006 AMD.

The purpose of the AMD is to:

- outline the minimum requirements for the collection and reporting of air monitoring data in Alberta;
- establish a set of consistent requirements for quality assurance practices that ensure, and allow for verification of, the quality of the air data collected in Alberta and ensure data comparability among monitoring sites; and
- provide guidance and criteria to operators of monitoring equipment, auditors, and the Regulator on minimum quality assurance requirements and air monitoring and reporting requirements.

The AMD outlines the methods acceptable to the Regulator for air monitoring and reporting, as required by an Alberta EPEA approval, Code of Practice registration, or any other air monitoring and reporting activities for which data is submitted to the Regulator or any other person acting on its behalf. In addition to the AMD, other regulatory tools exist to specify air monitoring requirements, including, but not limited to, the CEMS Code, Stack Sampling Code, and Substance Release Regulation.

Air monitoring data may be used to:

- assess and report on the state or quality of the environment;
- assess trends or perform analyses;
- determine compliance with guidelines and standards;
- input into modeling or forecasting applications; and
- make management and policy decisions.

Hence, it is essential that air data submitted is consistent, of high quality, and reliable.

In all parts of the AMD, mandatory requirements, which are enforceable and legally binding, are indexed and written in italicized text. Explanation and guidance regarding the requirements are provided in regular text.

The AMD uses the following definitions of shall, must, should, and may:

- shall, must: means deviation from requirements will constitute non-compliance with the AMD; and
- should, may: means the element is recommended.

Other definitions relevant to the AMD as a whole are provided in Appendix A.

Clauses in the AMD use the numbering format XX #-A, where:

- “XX” is a string of letters which is unique to each chapter of the AMD (e.g., for the AMD Introduction the string of letters is “Int”);
- “#” gives the section number according to the document’s outline numbering; and
- “A” provides an alphabetical listing of the clauses in that section of the document.

<i>Int 1-A</i>	<i>Unless otherwise specified, the requirements of the AMD apply to the person responsible, which includes:</i> <ul style="list-style-type: none"><i>(a) the owner of a facility that is the subject of an approval or other authorization under the Environmental Protection and Enhancement Act;</i><i>(b) the holder of an approval or other authorization under the Environmental Protection and Enhancement Act;</i><i>(c) the Alberta airshed; or</i><i>(d) any other person specified in any other part of the AMD.</i>
<i>Int 1-B</i>	<i>The person responsible shall conduct all air (a) monitoring and (b) reporting in accordance with the requirements of the AMD.</i>
<i>Int 1-C</i>	<i>The person responsible must adhere to the (a) monitoring, (b) reporting and (c) maintenance requirements set out in the AMD for any air monitoring data or reports submitted to the Regulator or any other person acting on its behalf.</i>

The Regulator will not accept any data or information that has been collected or derived from monitoring which has not been carried out in accordance with the requirements of the AMD.

2.0 Components of the Air Monitoring Directive

The AMD is comprised of the following components, as amended from time to time:

- AMD Chapter 1: Introduction, also referred to as the AMD Introduction;
- AMD Chapter 3: Ambient Monitoring Site Selection, Siting Criteria and Sampling System Requirements, also referred to as the Site Selection Chapter;
- AMD Chapter 4: Monitoring Requirements and Equipment Technical Specifications, also referred to as the Monitoring Chapter;
- AMD Chapter 5: Quality System, also referred to as the Quality System Chapter;
- AMD Chapter 6: Ambient Data Quality, also referred to as the Data Quality Chapter;
- AMD Chapter 7: Calibration, also referred to as the Calibration Chapter;
- AMD Chapter 8: Ambient Audit, also referred to as the Audit Chapter; and

- AMD Chapter 9: Reporting, also referred to as the Reporting Chapter.

The AMD webpage provides links to all chapters of the AMD and links to any documents or materials referred to in the AMD.

2.1 Review and Revision of the Air Monitoring Directive

The Air Monitoring Directive will be amended from time to time. The AMD Introduction will be amended to give a current record of what constitutes the AMD (see section 2.0).

Each chapter of the AMD has a release date and an effective date. Individual chapters may also have effective dates for specific requirements. Each chapter has an amendments section which outlines any amendments since release of the chapter.

Information on revisions to the AMD can be found on the AMD webpage. Interested stakeholders have the opportunity to provide feedback on draft chapters, amendments and guidance documents.

2.1.1 Amendments to AMD Introduction

December 10, 2019

1. In section 2.0, removed 1989 AMD and 2006 AMD from the list of what comprises the AMD.
2. In section 2.0, removed Chapter 2: Ambient Air Monitoring Program Planning from the list of what comprises the AMD.
3. In section 2.2, removed amendments to individual sections of 1989 AMD and 2006 AMD (originally Int 2-A through Int 2-BBB) and replaced with clauses Int 2-A and Int 2-B to amend and replace the 1989 AMD and 2006 AMD in their entirety.
4. In section 2.2, repealed Chapter 2: Ambient Air Monitoring Program Planning.
5. In Appendix A, removed definitions pertaining to airshed monitoring plans from Chapter 2.
6. In Appendix A, updated definition for CEMS User Manual to 2019 version.

December 16, 2016 (Amendments made to July 29, 2016 version)

1. Update to title page – reference to 1989 AMD.
2. Definitions moved to Appendix A. Added definitions for active sorbent sampler and active sorbent sampling.

3. In section 1.0, added reference to 1989 AMD and 2006 AMD, and added reference to definitions in Appendix A.
4. In section 2.0, updated list of what comprises the AMD to include the 1989 AMD and 2006 AMD, added abbreviated chapter names, and added effective dates for chapters 4 and 9. Added reference to correlation table in Appendix B for 1989 AMD and 2006 AMD requirements that remain in effect until chapters 4 and 9 take effect.
5. Minor wording changes in section 2.1.
6. Added section 2.1.1 to provide list of amendments made to the July 29, 2016 version of the AMD Introduction.
7. In Section 2.2, listed amendments made to 1989 AMD and 2006 AMD along with effective dates of new requirements, and added reference to correlation table in Appendix B.
8. In Appendix A, amended definition for required operating range to add further detail.
9. Added Appendix B correlation table to show which sections of the 2016 AMD replace which sections of the 1989 AMD and 2006 AMD, along with effective dates of new requirements.

2.2 Amendments to the Air Monitoring Directive

Refer to the correlation table in Appendix B for amendments listed in the order of the 1989 AMD and 2006 AMD, as well as effective dates.

<i>Int 2-A</i>	<i>The Air Monitoring Directive: Monitoring and Reporting Procedures for Industry (Alberta Environment 1989) is amended and replaced by the 2016 AMD, effective January 1, 2019.</i>
<i>Int 2-B</i>	<i>The 2006 Amendments to the Air Monitoring Directive, 1989 (Alberta Environment 2006) is amended and replaced by the 2016 AMD, effective January 1, 2019.</i>
<i>Int 2-C</i>	<i>Chapter 2: Ambient Air Monitoring Program Planning of the AMD is repealed effective December 10, 2019.</i>

3.0 General Requirements

<i>Int 3-A</i>	<i>If there is any discrepancy between submitted documents, records or data and the terms and conditions of the AMD the discrepancy shall be resolved in favour of the AMD.</i>
<i>Int 3-B</i>	<i>Any discrepancy between guidance documents supporting the AMD and the terms and conditions of the AMD shall be resolved in favour of the AMD.</i>
<i>Int 3-C</i>	<i>The terms and conditions of the AMD do not affect any rights or obligations created under any approval issued in accordance with the Act.</i>
<i>Int 3-D</i>	<i>The person responsible shall provide the Director, or anyone acting on the Director's behalf, with any documents, records and data related to air monitoring, reporting or maintenance activities that are requested in writing by the Director.</i>
<i>Int 3-E</i>	<i>The mention of trade names, commercial products or named technologies in the AMD does not constitute an endorsement or recommendation by Her Majesty the Queen in Right of Alberta, her employees, agents and the Director for general use.</i>
<i>Int 3-F</i>	<i>The terms and conditions of the AMD are severable. If any term or condition of the AMD or the application of any term or condition is held invalid, the application of such term or condition to other circumstances and the remainder of the AMD shall not be affected thereby.</i>
<i>Int 3-G</i>	<i>In the event that the person responsible (a) transfers responsibility of monitoring, reporting and maintenance or (b) transfers ownership of a facility, the person responsible must transfer all records and data to the successor.</i>
<i>Int 3-H</i>	<i>In the event that the person responsible goes out of business, the person responsible must immediately notify the Director in writing.</i>

4.0 Confidentiality

All air data submitted to the Regulator are subject to Alberta's *Freedom of Information and Protection of Privacy Act* (FOIP) requirements. In accordance with Section 35 of EPEA (disclosure of information), when the person responsible provides information that relates to a trade secret, process or technique that the person submitting the information keeps confidential, the person submitting the information may make a request in writing to the Director that the information be kept confidential and not be disclosed.

Preparing a confidentiality request cannot delay the submission of any required air data to the Regulator. All regulatory obligations must still be met, regardless of whether confidentiality is being requested.

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

5.0 Feedback Process

Stakeholders can submit any questions or comments on the AMD in writing to either of the following addresses:

AMDFeedback@gov.ab.ca

or

Air Monitoring Directive Comments
Air Policy Branch
Alberta Environment and Parks
Main Floor, Oxbridge Place
9820 – 106 Street
Edmonton, Alberta T5K 2J6

Website: AEP.alberta.ca/

Original signed by: _____
Hamid Namsechi, Director
Air Policy
Environment and Parks

Date: Dec 10, 2019

Appendix A Definitions and Acronyms

The following definitions shall apply to all chapters of the AMD, unless otherwise stated:

- (1) “AAAQO” means Alberta Ambient Air Quality Objectives and Guidelines, as listed in the Alberta Ambient Air Quality Objectives and Guidelines Summary (Alberta Environment and Sustainable Resource Development 2013), as amended from time to time;
- (2) “accuracy” means the level of agreement between a measurement or measurements and a known value;
- (3) “Act” means the *Environmental Protection and Enhancement Act*, RSA 2000, c. E-12, as amended from time to time;
- (4) “active sorbent sampler” means a sampling device or sampling system for conducting active sorbent sampling;
- (5) “active sorbent sampling” means intermittent sampling using sorbents as sampling media;
- (6) “AER” means the Alberta Energy Regulator;
- (7) “air data” means any measurements or information that describe air quality processes, location, or conditions; ecological or health effects and consequences; or the performance of technology (for example including, but not limited to, information collected directly from measurements, produced from models, and compiled from other sources, such as databases or the literature);
- (8) “air emission” means the release of a substance or substances into the atmosphere;
- (9) “air emission non-point source” means an area, on-road mobile, non-road mobile, volume, line or group of point sources responsible for the release of a substance to the atmosphere, which cannot be practically inventoried as separate individual sources or release points because they are too small, too large, too numerous, too geographically dispersed, or because they are non-stationary. Non-point sources include, but are not limited to, materials handling, mine face, mine fleet, solid mine tailings, non-stationary equipment, fugitive leaks, road dust, space heating, storage tanks and liquid tailings ponds;
- (10) “air emission release point” means a stationary source responsible for the release of a substance to the atmosphere that can be practically traced back to a single identifiable source, such as, but not limited to, a smokestack;
- (11) “Alberta airshed” means a registered society whose objects and operations control, manage or administer ambient air monitoring stations in a specified geographic area in Alberta and whose operations include monitoring and reporting of ambient air quality to the public and the Regulator. Without limiting the generality of the foregoing, Alberta

airsheds include the following: West Central Airshed Society, Wood Buffalo Environmental Association, Parkland Airshed Management Zone, Peace Airshed Zone Association, Lakeland Industry and Community Association, Fort Air Partnership, Calgary Region Airshed Zone, Palliser Airshed Society, Alberta Capital Airshed and Peace River Air Monitoring Program;

- (12) “Alberta’s Ambient Air Quality Data Warehouse” means Alberta’s current central repository for ambient air quality data collected in the province, made available online to the public;
- (13) “Alberta Real-time Ambient Air Website” means Alberta’s current central repository for real-time ambient air monitoring data collected in the province, made available online to the public;
- (14) “ambient air” means the portion of the atmosphere, external to structures (i.e., outside);
- (15) “ambient air monitoring data” means air data, including, but not limited to, measured ambient air concentrations, speciation, deposition, meteorological parameters, method codes, units of measurement, time period of measurement and any required data flags;
- (16) “ambient air monitoring station” means a continuous, passive, static, intermittent or portable ambient air monitoring station;
- (17) “AMD” means Alberta’s current Air Monitoring Directive, as amended from time to time;
- (18) “AMD Introduction” means the Introduction chapter of the AMD (Chapter 1), which contains requirements that apply to the entire AMD as a whole;
- (19) “analyzer” means any of various instruments used for performing an analysis (e.g., continuous ambient air analyzer);
- (20) “analyzer drift” means a gradual increase or decrease in analyzer output over a period of time;
- (21) “annual actual air emissions” means the actual, measured or estimated quantity of a substance being emitted to the atmosphere from a source during a specific calendar year;
- (22) “anomalous data” means data that are incongruous or inconsistent with data expected for a particular time or place;
- (23) “approval” means an approval issued under the Act in respect of an activity, and includes the renewal of or an amendment to an approval;
- (24) “AQHI” means the Air Quality Health Index;
- (25) “as found or unadjusted” means the output value of the measurement device that corresponds to the reference value input before a calibration check or adjustment;

- (26) “ASTM” means American Society for Testing and Materials;
- (27) “audit” means a systematic and independent examination to determine whether activities and related results comply with defined specifications and requirements, including, but not limited to, audits of the performance of air quality monitoring equipment, calibration gas standards used in air quality monitoring, and air quality monitoring station(s);
- (28) “Audit Chapter” means the Ambient Audit Chapter (Chapter 8) of the AMD;
- (29) “auditor” means the person working on behalf of the Regulator to audit the air quality monitoring station or equipment;
- (30) “Audit Summary Report” means a concise record of the audit findings for critical, non-critical, or inspection items, indicating the cause of an audit failure and the specific need or opportunity for improvement;
- (31) “background” means an ambient air monitoring station which is sited in a rural or remote area with essentially no local source contribution;
- (32) “BAM” means Beta Attenuation Monitor;
- (33) “base average” means the minimum time resolution of averaged data values collected;
- (34) “baseline concentration” when pertaining to ambient data verification means the minimum measured concentration over an extended period of time (e.g., days or weeks);
- (35) “baseline correction” means an adjustment applied to data based on elevated baseline concentrations;
- (36) “BTEX” means benzene, toluene, ethylbenzene, xylene;
- (37) “calibration” means the steps taken to establish a quantitative relationship between the actual value of a standard and an analyzer’s or instrument’s response. This relationship can then be used to convert subsequent analyzer response values to corresponding concentrations;
- (38) “Calibration Acceptance Criteria” means measurement quality objectives for calibration checks;
- (39) “Calibration Chapter” means the Calibration Chapter (Chapter 7) of the AMD;
- (40) “calibration gas” means a reference gas or gas mixture of precisely defined concentration used as a comparative standard in the calibration of air analyzers;
- (41) “calibration system” means the calibrators, calibration gases, gas cylinder regulators, zero air systems, flow measurement devices, calculations, calculators and procedures used to conduct a calibration of air analyzers;

- (42) “calibrator” means a device used to check or determine, by comparison with a standard, the operation of a quantitative measuring device;
- (43) “canister” means a sampling device or sampling system for conducting canister sampling;
- (44) “canister sampling” means intermittent sampling using canisters as sampling media;
- (45) “CAPMoN” means Canadian Air and Precipitation Monitoring Network;
- (46) “CAS” means the Chemical Abstracts Service;
- (47) “CASA” means the Clean Air Strategic Alliance;
- (48) “CEMS” means Continuous Emissions Monitoring System;
- (49) “CEMS Code” means the Alberta Continuous Emission Monitoring System Code (Alberta Environmental Protection 1998), as amended from time to time;
- (50) “CEMS User Manual” means the Electronic Reporting of Continuous Emission Monitoring (CEMS) Information User Manual (Alberta Environment and Parks 2019), as amended from time to time;
- (51) “certification methodology of the electronic submission system” means the mechanism by which data is certified during submission to an electronic reporting system. The certification methodology can include, but may not be limited to, authorized user-specific login credentials and digital sign off on the data prior to final submission;
- (52) “Certified Reference Material” means a reference material having one or more property values that are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation that is issued by a certifying authority;
- (53) “certify” means formally signed-off by the person responsible, indicating that the data or reports being submitted to the Director (a) have been reviewed by the person responsible prior to submission, (b) accurately reflect the monitoring results and reporting timeframe and (c) meet the specified analysis, summarization and reporting requirements;
- (54) “CH₄” means methane;
- (55) “CGA” means cylinder gas audit;
- (56) “CO” means carbon monoxide;
- (57) “Codes for Electronic Reporting” means the industrial operation specific report provided to the person responsible for submitting CEMS data to the Director, as referenced in the CEMS User Manual;
- (58) “continuous” means measurements available in or near real-time without interruption of the measurement cycle;

- (59) “continuous ambient monitoring” means air sampling or flow measurement through equipment that creates an uninterrupted output of the analysis or flow measurement;
- (60) “Continuous Emission Monitoring System” means the equipment as a system required to analyze, measure, and provide, on a continuous basis, a permanent record of emission and other parameters as established by the CEMS Code;
- (61) “controlled documents” mean documents detailing the processes for, or critical to the function of, the person responsible’s Quality System (for example, operator manuals, QAP, SOPs);
- (62) “correction” means the immediate actions taken to address the effects of an actual or potential non-compliance;
- (63) “correction factor” means a mathematical adjustment made to a calculation to account for deviations in either the sample or the method of measurement;
- (64) “corrective action” means the steps taken to correct the root cause of a non-compliance in order to prevent re-occurrence;
- (65) “cycle time” when pertaining to semi-continuous monitoring methods (such as gas chromatography and beta attenuation methods) means the time required to complete the active measurement cycle including sample collection, analysis, measurement and output;
- (66) “Cylinder Gas Audit” means a challenge of a monitoring system with a cylinder gas of a known concentration which is traceable to standard reference materials (SRMs) of the U.S. National Institute of Standards and Technology (NIST) according to Protocol 1 of the US EPA;
- (67) “data acquisition system” (DAS) means the system used to collect and transfer data to a data management system;
- (68) “data management system” means the system used to organize, store, verify, validate, and report data;
- (69) “data quality objectives” mean the qualitative and quantitative statements that clarify study objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions;
- (70) “Data Quality Chapter” means the Ambient Data Quality Chapter (Chapter 6) of the AMD;
- (71) “data validation” means determination of data quality based on defined data quality objectives;
- (72) “data validation code” means a code or flag associated with a data record as an indicator of validity or of the fact and reason that a data record is considered invalid;

- (73) “data verification” means an evaluation of instrument performance against the method and procedural requirements;
- (74) “defensible” means the ability to withstand any reasonable challenge related to the veracity or integrity of monitoring and reporting records, and derived data;
- (75) “Department” means the responsible Government of Alberta department, as designated under the Act;
- (76) “deposition” means a complex chemical and atmospheric process whereby emitted compounds are transferred from the air to surfaces including vegetation, water and soil in wet or dry form;
- (77) “derived parameters” means data that is created or calculated from other data within the database or system;
- (78) “Director” means a person designated as a Director for the purposes of the Act;
- (79) “disposition” means the final action taken with records that are no longer in active use; for example filing, storing or destroying;
- (80) “distance constant” means the length of fluid flow past the sensor required to cause it to respond to 63.2% of the increasing step-function change in speed;
- (81) “document” (noun) means information and its supporting medium (e.g., the written requirements of a Quality System);
- (82) “document” (verb) means to produce documentary evidence of an activity;
- (83) “downwash” means turbulent eddies formed on the downwind side of a building or structure forcing the air current down to the ground;
- (84) “drift” means a gradual increase or decrease in analyzer output over a period of time;
- (85) “emergency monitoring” means air quality monitoring that is conducted during an unplanned event with the intent to assess an environmental emergency situation, such as fire or release of substances in potentially hazardous quantities;
- (86) “EPEA” means the *Environmental Protection and Enhancement Act*;
- (87) “exceedance” means a stack, source or ambient reading not meeting established limits, guidelines, standards, objectives or performance criteria, as determined according to established procedures;
- (88) “fail” or “failure” means a term used in the audit process or an Audit Summary Report to denote that demonstrated response to audit standards is outside the audit limits on at least one criterion;

- (89) “fall time” means the time interval between the initial analyzer response (the first observable change in analyzer output) and a steady signal output after a step decrease in input concentration;
- (90) “FDMS” means Filter Dynamics Measurement Systems;
- (91) “filtration sampler” means a sampling device or sampling system for conducting filtration sampling;
- (92) “filtration sampling” means intermittent sampling using filters as sampling media;
- (93) “GC” means gas chromatography;
- (94) “GPT” mean gas phase titration;
- (95) “guidance” means a suggested best practice that is not mandatory, but is intended as an aid or example in complying with a standard or requirement;
- (96) “HC” means hydrocarbons;
- (97) “HiVol” means a type of intermittent sampler called a high-volume air sampler;
- (98) “H₂S” means hydrogen sulphide;
- (99) “independent assessment” means an assessment of validated data by someone independent of both field operations and primary data validation;
- (100) “industrial operation” means any facility, plant, site, mine, structure or thing where an activity listed in the Activities Designation Regulation occurs, including all the buildings, equipment, machinery and vehicles that are an integral part of the activity;
- (101) “initial instrument calibration” means the first calibration of a monitoring or measurement device, generally a multipoint calibration;
- (102) “inspection” means a formal or official evaluation of the conformity of a property, commodity, or process by observation or judgment to confirm that it meets a specified requirement; generally including measurement, testing, or gauging, as appropriate;
- (103) “instrument” means any of various equipment used for air monitoring, reporting and maintenance activities (e.g., monitoring equipment, calibrator);
- (104) “integrated sampler” means a sampling device or sampling system for conducting integrated sampling;
- (105) “integrated sampling” means an ambient air monitoring method such as passive sampling, intermittent sampling, and static sampling, where a concentration or mass uptake of a pollutant in the ambient air is determined by laboratory analysis and integrated over the sampling period for a time-weighted average measurement;

- (106) “intermittent sampler” means a sampling device or sampling system for conducting intermittent sampling;
- (107) “intermittent sampling” means a discrete, non-continuous measurement of a pollutant concentration using a filter, sorbent, canister or other sampling media through which air is either actively pumped or flows by differential pressure (vacuum);
- (108) “invalid data” means data which do not satisfy the quality assurance objectives set out in the AMD or a person responsible’s Quality System;
- (109) “linearity” means the maximum deviation between the actual analyzer output reading and the predicted analyzer output from a least square fit to the actual readings;
- (110) “Lower Detection Limit” means the lowest detectable quantity of analyte that can be distinguished from the absence of the analyte (i.e., zero-air for gas analyzers);
- (111) “manifold” means a pipe or chamber having multiple apertures for making connections (to analyzers);
- (112) “may” means the element is recommended;
- (113) “maximum air emissions” means the maximum rate at which a substance is emitted to the atmosphere from a source, factoring in emission limits, equipment specifications, or other relevant information;
- (114) “measurement uncertainty” – see “uncertainty of measurement”;
- (115) “meteorological sensor” means a device that measures or estimates the state of the atmosphere at a given time, such as temperature, pressure, humidity, wind speed and direction;
- (116) “method blank” as it relates to passive sampling, means an unexposed passive sample;
- (117) “mobile air monitoring” means ambient air monitoring that is conducted using a motorized, mobile vehicle that houses instruments and supplies power for these instruments for measuring continuous ambient air pollutant concentrations and meteorology in both stationary and moving scenarios;
- (118) “Monitoring Chapter” means the Monitoring Requirements and Equipment Technical Specifications Chapter (Chapter 4) of the AMD;
- (119) “monitoring network” means the various ambient air monitoring sites in a given area;
- (120) “monitoring objective” means the purpose and scope of monitoring in a given area;
- (121) “month” means calendar month;

- (122) “must” means deviation from requirements will constitute non-compliance with the AMD;
- (123) “N₂” means nitrogen;
- (124) “NAIT” means the Northern Alberta Institute of Technology;
- (125) “NAPS” means National Air Pollution Surveillance program;
- (126) “NH₃” means ammonia;
- (127) “NIST” means United States National Institute of Standards and Technology;
- (128) “NMHC” means non-methane hydrocarbons;
- (129) “NO” means nitrogen oxide;
- (130) “NO₂” means nitrogen dioxide;
- (131) “non-compliance” means the failure to meet a requirement set out within the AMD, the person responsible’s Quality System or other requirement specified in writing by the Director;
- (132) “NO_x” means oxides of nitrogen;
- (133) “noise” means variability in the signal of an analyzer (the difference between the maximum and minimum values of the signal);
- (134) “normal air emissions” means the rate at which a substance is emitted to the atmosphere from a source under normal operating conditions;
- (135) “NPRI” means the Environment Canada National Pollutant Release Inventory;
- (136) “O₃” means ozone;
- (137) “outliers” means subjectively (as opposed to statistically), values which are unusually high or low, inconsistent with data expected for the site;
- (138) “passive sampler” means a sampling device or sampling system for conducting passive sampling;
- (139) “passive sampling” means determination of a pollutant concentration in ambient air by collecting gases or vapours from the atmosphere at a rate controlled by a physical process such as gaseous diffusion through a static air layer or a porous material, or permeation through a membrane, but which does not involve active pumping of ambient air through the sampler;

- (140) “personnel” means anyone performing monitoring, maintenance or reporting activities, including, but not limited to, employees and volunteers;
- (141) “person responsible” means (i) the owner of a facility that is the subject of an approval or other authorization under the *Environmental Protection and Enhancement Act*, (ii) the holder of an approval or other authorization under the *Environmental Protection and Enhancement Act*, (iii) the Alberta airshed, or (iv) any other person specified in any other part of the AMD;
- (142) “PM₁₀” means particulate matter (airborne particles) smaller than 10 micrometres in diameter;
- (143) “PM_{2.5}” means fine particulate matter (airborne particles) smaller than 2.5 micrometres in diameter;
- (144) “pollution control technology or equipment” means any technology, process or piece of equipment which captures, reduces, limits or destroys air pollutants from an exhaust stream or other source before it is emitted into the atmosphere;
- (145) “portable monitoring” means air sampling or flow measurement through portable equipment that creates an uninterrupted output of the analysis or flow measurement, usually done at a temporary monitoring location for a specific period of time, usually two to six months;
- (146) “ppb” means parts per billion;
- (147) “ppm” means parts per million;
- (148) “precipitation sampling equipment” means an automated sampling device that opens during precipitation to collect a sample and closes during dry periods to protect the sample (includes a wetness sensor to identify precipitation periods and a sample container that can be removed to decant collected sample);
- (149) “precision” means the agreement between repeated measurements;
- (150) “preventive action” means the steps taken to correct the root cause of a potential non-compliance;
- (151) “promulgated” means formally accepted, or approved for use, by a qualified government organization, such as the United States Environmental Protection Agency;
- (152) “QAP” means Quality Assurance Plan;
- (153) “QA/QC” means Quality Assurance and Quality Control;
- (154) “Quality Assurance (QA)” means the administrative and procedural activities implemented in a Quality System to prevent mistakes or defects and to avoid problems in the resulting product, service or activity;

- (155) “Quality Assurance Plan” means the documentation of a Quality System;
- (156) “Quality Control (QC)” means the technical activities implemented in a Quality System to review and inspect the quality of a product, service or activity against defined standards or requirements;
- (157) “quality management” means the coordinated activities including quality assurance and quality control used by an organization to ensure that its products, services or activities are delivered with consistent quality;
- (158) “Quality System Chapter” means the Quality System Chapter (Chapter 5) of the AMD;
- (159) “Quality System” means a structured system consisting of the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization, for ensuring quality in its work processes, products, services and activities. 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;
- (160) “raw data” means the original, un-manipulated value obtained from an instrument or analysis. For continuous analyzers, the original un-manipulated value means the value obtained after conversion of the voltage to a concentration;
- (161) “RATA” means Relative Accuracy Test Audit;
- (162) “record” (noun) means a document describing results achieved or providing evidence of activities performed (e.g., calibration reports, maintenance records, non-compliance reports, field sheets, station log books);
- (163) “record” (verb) means to keep an account of facts or events, for example by writing them down or storing electronically;
- (164) “reference method” when pertaining to the Reporting Chapter is any method of sampling and analyzing a substance, or determining flow rate, as specified in the Alberta Stack Sampling Code, or any other such air monitoring method authorized in writing by the Director;
- (165) “reference method monitor”, as it relates to passive sampling, means a suitable monitor or sampler of known performance, such as a continuous analyzer, for comparison with the performance of a passive sampler;
- (166) “Regulator” means a person who is vested with a power, duty or function under the *Environmental Protection and Enhancement Act* and includes, without limiting the generality of the foregoing: (i) a designated Director or other official, (ii) the responsible Government of Alberta department, as designated under the *Environmental Protection and Enhancement Act*, and (iii) the Alberta Energy Regulator, as designated under the *Responsible Energy Development Act*;

- (167) “regulator” (pertaining to analyzer calibration) means a valve that is used to regulate the pressure of a gas;
- (168) “relative accuracy” when pertaining to a CEMS is the absolute mean difference between the gas concentration or emission rate determined by a CEMS and the value determined by an appropriate reference method plus the 2.5 percent error confidence coefficient of a series of tests, divided by the mean of the reference method tests;
- (169) “Relative Accuracy Test Audit” means the test required by the CEMS Code to determine relative accuracy in order to provide a measure of the systematic and random errors associated with data from a CEMS;
- (170) “Reporting Chapter” means the Reporting Chapter (Chapter 9) of the AMD;
- (171) “required operating range” (full scale) means the ranges allowed for analog data collection from analyzers. Most analyzers are capable of outputting ranges far exceeding the required range. Digital output from an instrument should not affect resolution of the reported data; but, the scaling of analog output can affect data resolution. The range selected also represents the full scale for calibration of analyzers regardless of data collection method. Ranges should be selected that are most appropriate for the monitoring situation;
- (172) “requirement” means a formal statement of an action which is mandatory and must be followed;
- (173) “resolution” means the minimum discernible difference that can be determined between incremental measurements (can be determined operationally through data collection configurations);
- (174) “rise time” means the time interval between initial response (the first observable change in analyzer output) and a steady signal output after a step increase in input concentration;
- (175) “root mean square” or “RMS” means the square root of the average of the squares of differences from zero;
- (176) “SAIT” means the Southern Alberta Institute of Technology;
- (177) “sample” means (i) a single item or specimen from a larger whole or group, such as any single air quality sample of any medium or (ii) a group of samples from a statistical population whose properties are studied to gain information about the whole;
- (178) “samplers” means equipment used for sampling components of ambient air;
- (179) “sampling” means the process of obtaining a subset of measurements from a population;
- (180) “sampling inlet” means the opening to the atmosphere for sampling line(s) or a manifold;

- (181) “sampling period” means the period of time between the start and end of a sampling event;
- (182) “sampling system” means all the equipment used for sampling or measuring components of ambient air (e.g., manifolds, analyzers, precipitation samplers, wind instruments, etc.);
- (183) “scan rate” means the interval at which a datalogger retrieves an instrument value which is used for subsequent averaging;
- (184) “SDWD” means Standard Deviation of Wind Direction;
- (185) “secondary standard” is a synonym for working standard;
- (186) “semi-continuous” means measurements available in near real-time, with measurement cycles up to one hour;
- (187) “sensor” means a mechanical device sensitive to light, temperature, radiation level, or the like, that transmits a signal to a measuring or control instrument;
- (188) “sensor grid” means the surface of a wetness sensor that comes into contact with precipitation;
- (189) “shall” means deviation from requirements will constitute non-compliance with the AMD;
- (190) “should” means the element is recommended;
- (191) “Site Selection Chapter” means the Ambient Monitoring Site Selection, Siting Criteria and Sampling System Requirements Chapter (Chapter 3) of the AMD;
- (192) “source sampling” means the type of sampling carried out on an industrial source including, but not limited to, manual stack sampling, RATA and CGA;
- (193) “span” means an instrument’s output range, from minimum to maximum scale value;
- (194) “span drift” means the percent change in analyzer output in response to a consistent upscale pollutant concentration within a 24 hour period of unadjusted continuous operation;
- (195) “special air studies” means any additional air monitoring studies carried out by an industrial operation or Alberta airshed that go beyond their normal routine air monitoring (for example for the industrial operation’s or Alberta airshed’s own purposes, or to satisfy an EPEA approval requirement or written notice from the Director);
- (196) “spectral range” when pertaining to solar radiation measurements means the range of incident radiation a sensor can detect;
- (197) “stack sampling” means a method, or series of methods, to extract a sample from a stack

- or duct that is representative of the emissions from that source, usually conducted during normal operating conditions, or at conditions specified in the approval;
- (198) “standard” means something considered by an authority or by general consent as a basis of comparison (e.g., a certified test gas);
 - (199) “Standard Operating Procedure” or “SOP” means a document that details in writing the procedure for an operation, analysis, or action with thoroughly prescribed techniques and steps, designated as the official method for performing routine or repetitive tasks;
 - (200) “Standard Reference Material” means a reference material distributed and certified by the appropriate national institute for standardization;
 - (201) “starting threshold” when pertaining to wind speed and wind direction measurements means the minimum wind speed required for an instrument response;
 - (202) “static sampler” means a sampling device or sampling system for conducting static sampling;
 - (203) “static sampling” means a measurement of total accumulated mass uptake of a pollutant in ambient air using a container for gravitational settling of particulate matter, or a cylinder or plate containing a filter coated with a reactive surface to absorb the pollutant of interest;
 - (204) “station operator” means the party that operates an air monitoring station and conducts the monitoring activities, which can be the person responsible or someone acting on behalf of the person responsible, who is responsible for the day to day maintenance of the station;
 - (205) “submit” means the transfer of files or documents containing the required content. Examples include, but are not limited to, the transfer of files via an electronic reporting system, emailing of reports, or sending files on a flash drive. Note that sending a link to a File Transfer Protocol site would not constitute submission to the Regulator, as the files or documents are not actually transferred from the person responsible to the Regulator;
 - (206) “substance” means any matter, as defined in EPEA, that (i) is capable of becoming dispersed in the environment, and/or (ii) is capable of becoming transformed in the environment;
 - (207) “support equipment” means devices that are not the actual monitoring instrument, but are necessary to support monitoring and reporting operations;
 - (208) “SWD” means Scalar Wind Direction;
 - (209) “SWS” means Scalar Wind Speed;
 - (210) “TEOM” means Tapered Element Oscillating Microbalance;

- (211) “THC” means total hydrocarbons;
- (212) “third party” means an individual or company who has no connection to the operation of the monitoring station, its associated network or the data arising from it, but has demonstrated applicable expertise;
- (213) “traceable” means information is available regarding where and how a product and its parts or contents were made;
- (214) “TRS” means total reduced sulphur;
- (215) “TSP” means total suspended particulate;
- (216) “uncertainty of measurement” means a parameter associated with the result of a measurement that characterizes the dispersion of values that could reasonably be attributed to the actual value being measured;
- (217) “US EPA” means United States Environmental Protection Agency;
- (218) “UV” means ultraviolet;
- (219) “validation” means the confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled;
- (220) “valid data” means data of known and documented quality that satisfy, at a minimum, the requirements set out in the AMD;
- (221) “VOC” means volatile organic compound;
- (222) “VSL” means Van Swinden Laboratorium, the National Metrology Institute of the Netherlands;
- (223) “VWD” means Vector Wind Direction;
- (224) “VWS” means Vector Wind Speed;
- (225) “wetness sensor” means a component of precipitation sampling equipment used to indicate the occurrence of precipitation;
- (226) “wind instrument” means an instrument used for measuring the direction and speed of the wind;
- (227) “working standard” means a measurement standard used to check or calibrate measuring instruments. A working standard is a standard that is prepared for a specific analysis. It is usually standardized against a primary standard;
- (228) “year” means calendar year, unless otherwise specified;
- (229) “zero” means an instrument’s response as compared to a zero reference standard;

- (230) “zero drift” means the change in analyzer output in response to a consistent zero air input concentration within a 24 hour period of unadjusted continuous operation; and
- (231) “zero noise” means a measure of the deviations from zero while sampling constant zero air input, measured as the root mean square (RMS).

Appendix B Air Monitoring Directive Correlation Table

The following correlation table helps users identify where revisions, additions, and deletions were made to Alberta’s Air Monitoring Directive (AMD). It shows a history of the repealed and replaced sections of the 1989 AMD and its 2006 amendment. The table is ordered using the layout of the original 1989 AMD (the far left column). The 2006 AMD Amendments column shows which sections of the 1989 AMD were replaced or repealed by its 2006 amendment. The far right column lists the 2016 AMD chapters that replace the corresponding sections of the 1989 AMD or its 2006 amendment. The effective dates denote when the 2016 AMD requirements came into effect.

1989 AMD		2006 AMD Amendments	2016 AMD	
Section	Title		Chapter	Effective
I	Introduction	-Repealed-	--	
I.A	General	Guidance for Use	Chapter 1: Introduction	Feb 1, 14
--		0.0 Amendments to the AMD 1989	Chapter 1: Introduction	Feb 1, 14
I.B	Applicability to Specific Industry Sectors	1.1 Application 1.2 General	Chapter 1: Introduction	Feb 1, 14
I.C	Data Confidentiality	Data Confidentiality	Chapter 1: Introduction	Feb 1, 14
I.D	Description of Roles of the Divisions of Pollution control and Standards and Approvals	-Repealed-	--	
--		2.0 Quality System	Chapter 5: Quality System	Jun 20, 15
--		Sections 2.1 through 2.8	Chapter 5: Quality System	Jun 20, 15
--		Clauses 2.9.1 through 2.9.33	Chapter 5: Quality System	Jun 20, 15
--		Clauses 2.9.34, 2.9.37, 2.9.38, 2.9.40 through 2.9.43, and 2.9.45 through 2.9.47	Chapter 7: Calibration	Sep 23, 15
--		Clauses 2.9.35, 2.9.36., 2.9.39, and 2.9.44	Chapter 5: Quality System	Jun 20, 15
--		Clauses 2.9.48 through 2.9.59	Chapter 5: Quality System	Jun 20, 15
--		3.0 Reporting Requirements	Chapter 9: Reporting	Jan 1, 19
--		Appendix A Definitions	Chapter 1: Introduction	Feb 1, 14

1989 AMD		2006 AMD Amendments	2016 AMD	
Section	Title		Chapter	Effective
II	Monitoring			
II.A	Site Section	--	Chapter 3: Site Selection	Sep 23, 15
II.A.1	Network and Site Documentation	--	Chapter 3: Site Selection	Sep 23, 15
II.B	Instrument Selection	--	Chapter 4: Monitoring	Jul 30, 17
II.C	Monitoring Operations and Guidelines			
II.C.1	Continuous Ambient Monitoring Operation and Guidelines			
II.C.1.a	General bullets (i through iv)	--	Chapter 6: Data Quality	Jun 20, 16
II.C.1.a	General bullet (v)	--	Chapter 4: Monitoring	Jul 30, 17
II.C.1.a	General bullet (vi)	--	Chapter 9: Reporting	Jan 1, 19
II.C.1.b	Sampling Procedures	--	Chapter 3: Site Selection	Sep 23, 15
II.C.1.c	Sample Analysis	--	Chapter 7: Calibration	Sep 23, 15
II.C.1.d (i)	Data Validation and Data Reporting	--	Chapter 6: Data Quality	Jun 20, 16
II.C.1.d (ii through v)	Data Validation and Data Reporting	--	Chapter 9: Reporting	Jan 1, 19
II.C.1.e	Calibration	--	Chapter 7: Calibration Chapter 8: Audit	Sep 23, 15
II.C.1.f	SO ₂ Monitors	--	Chapter 7: Calibration	Sep 23, 15
II.C.1.g	H ₂ S Monitors			
II.C.1.h	NO/NO ₂ /NO _x Monitors			
II.C.1.i	NH ₃ Monitors			
II.C.1.j	CO Monitors			
II.C.1.k	Total Hydrocarbon Monitors			
II.C.1.l	Wind Monitors			
II.C.1.m	Other Monitors			
II.C.1.n	Quality Assurance	--	Chapter 8: Audit	Sep 23, 15
II.C.2	Static and Intermittent Monitoring Requirements			
II.C.2.a	Exposure Stations	--	Chapter 4: Monitoring	Jul 30, 17
II.C.2.b.i	High Volume Samplers	--	Chapter 4: Monitoring	Jul 30, 17
II.C.2.b.ii&iii	High Volume Samplers	--	Chapter 7: Calibration	Sep 23, 15

1989 AMD		2006 AMD Amendments	2016 AMD	
Section	Title		Chapter	Effective
II.C.2.b.(iv through vi)	High Volume Samplers	--	Chapter 4: Monitoring	Jul 30, 17
II.C.3	Soil Monitoring Guidelines	--	Directive for Monitoring the Impact of Sulphur Dust on Soils (2015)	Jan 1, 16
II.C.4	Vegetation Monitoring	--	Chapter 4: Monitoring	Jul 30, 17
II.C.5	Other Monitoring	--	Chapter 4: Monitoring	Jul 30, 17
II.D	Continuous Stack Emission Monitoring Operations and Guidelines			
II.D.1	General	-Repealed-	--	
II.D.2	Record Keeping	-Repealed-	--	
II.E	Manual Stack Surveys			
II.E.1	Sampling Procedures	--	Chapter 4: Monitoring	Jul 30, 17
II.E.2	Notification of Planned Stack Surveys	--	Chapter 9: Reporting	Jan 1, 19
II.E.3	Report Preparation	--	Chapter 9: Reporting	Jan 1, 19
II.E.4	Jurisdiction	--	-Repealed-	Jul 30, 17
III	Reporting			
III.A	Excessive Pollutant Reports	--	Chapter 9: Reporting	Jan 1, 19
III.B	Monthly Reports			
III.B.1	General	--	Chapter 9: Reporting	Jan 1, 19
III.B.2	Ambient Monitoring	--	Chapter 9: Reporting	Jan 1, 19
III.B.3	Stack Sampling	--	Chapter 9: Reporting	Jan 1, 19
III.B.4	Continuous Emission Monitoring Results	-Repealed-	--	
III.B.5	Production Reports	--	Chapter 9: Reporting	Jan 1, 19
III.C	Annual Reports	--	Chapter 9: Reporting	Jan 1, 19
IV	APPENDICES			
IV.A	Monitoring			
IV.A.1	Standard Site Criteria	--	Chapter 3: Site Selection	Sep 23, 15
IV.A.2	Standard Network and Site Documentation	--	Chapter 3: Site Selection	Sep 23, 15
IV.A.3	Determination of Total Sulphation (Static Monitoring)	--	Chapter 4: Monitoring	Jul 30, 17
IV.A.4	Determination of Hydrogen Sulphide (Static Monitoring)	--	Chapter 4: Monitoring	Jul 30, 17

1989 AMD		2006 AMD Amendments	2016 AMD	
Section	Title		Chapter	Effective
IV.A.5	Determination of Water Soluble Fluorides (Static Monitoring)	--	-Repealed-	Jul 30, 17
IV.A.6	Determination of Dustfall (Static Monitoring)	--	Chapter 4: Monitoring	Jul 30, 17
IV.A.7	Soil Monitoring	--	Directive for Monitoring the Impact of Sulphur Dust on Soils (2015)	Jan 1, 16
IV.A.8	High Volume Sampling	--	-Repealed-	Jul 30, 17
IV.A.9	Vegetation - Fluoride Analysis	--	Chapter 4: Monitoring	Jul 30, 17
IV.A.10	Quality Assurance of Continuous Ambient Monitoring Systems			
IV.A.10.1	Ambient Air Monitoring			
IV.A.10-1.1	Methods for the Measurement of Ambient Air Pollutants	--	Chapter 4: Monitoring	Jul 30, 17
IV.A.10-1.2	Acceptable Performance Specifications for Monitors	--	Chapter 4: Monitoring	Jul 30, 17
IV.A.10-1.3	Typical Design of a Manifold	--	Chapter 3: Site Selection	Sep 23, 15
IV.A.10-1.4	Acceptable Materials for Sampling	--	Chapter 3: Site Selection	Sep 23, 15
IV.A.10-1.5	Flow Measurements and Corrections	--	Chapter 7: Calibration	Sep 23, 15
IV.A.10-1.6	Calibration Procedures, Calculations and Acceptance Limits	--	Chapter 7: Calibration	Sep 23, 15
IV.A.10-1.7	Examples of Calibration Reports	--	Chapter 7: Calibration	Sep 23, 15
IV.A.10-1.8	Audit Assessment Criteria	--	Chapter 8: Audit	Sep 23, 15
IV.A.10.2	Wind Monitoring			
IV.A.10-2.1	Instrument Selection	--	Chapter 4: Monitoring	Jul 30, 17
IV.A.10-2.2	Wind Instrument Orientation by the Local Apparent Noon Method	--	Chapter 3: Site Selection	Sep 23, 15
IV.A.10-2.3	Check Procedures	--	Chapter 7: Calibration	Sep 23, 15
IV.A.10-2.4	Calibration	--	Chapter 7: Calibration	Sep 23, 15
IV.A.11	Heavy Metals Analysis	--	-Repealed-	Jul 30, 17
IV.A.12	Determination of Nitrogen Dioxide (Static Monitoring)	--	-Repealed-	Jul 30, 17
IV.B	Reporting	--	Chapter 9: Reporting	Jan 1, 19
--		--	Chapter 2: Planning	Repealed Dec 10, 2019

-- denotes that there is no corresponding section in that version of the AMD