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**Air Monitoring Directive Chapter 2:
Ambient Air Monitoring Program Planning**

August 3, 2016

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1.0 Purpose

This Ambient Air Monitoring Program Planning document forms a part (Chapter 2) of Alberta's Air Monitoring Directive (Alberta Environment and Parks 2016, as amended from time to time) and will hereafter be referred to as the Planning Chapter. Refer to Chapter 1 (the AMD Introduction) for requirements and definitions that apply to all parts of the AMD, a list of what components constitute the AMD, and details on review of and revisions to the AMD.

The purpose of the Planning Chapter is to:

- outline a process for gathering information to design ambient air monitoring programs; and
- establish a set of consistent requirements for the documentation of ambient air monitoring programs through the development, and submission and review of an ambient air monitoring plan.

MP 1-A The requirements of the Planning Chapter of the AMD apply to Alberta airsheds, as defined in the AMD.

MP 1-B Alberta airsheds must be in compliance with the Planning Chapter of the AMD on or before February 1, 2015 unless written authorization is received from the Director.

The development and maintenance of ambient air monitoring plans provides the Department with documentation of the rationale and scientific rigor for the location of monitoring stations, objectives of monitoring programs and siting changes over time. Consistent requirements for monitoring plan components, along with requirements in other AMD chapters, encourage a coherent ambient air monitoring and management system across the province.

The Planning Chapter requires specific information be submitted to the Department, but how these requirements are met should be determined by the Alberta airshed.

Figure 1 presents an overview of the process that should be followed when developing a new or revising an existing ambient air monitoring plan.

1.1 Amendments

August 3, 2016

1. Update to document design/branding.

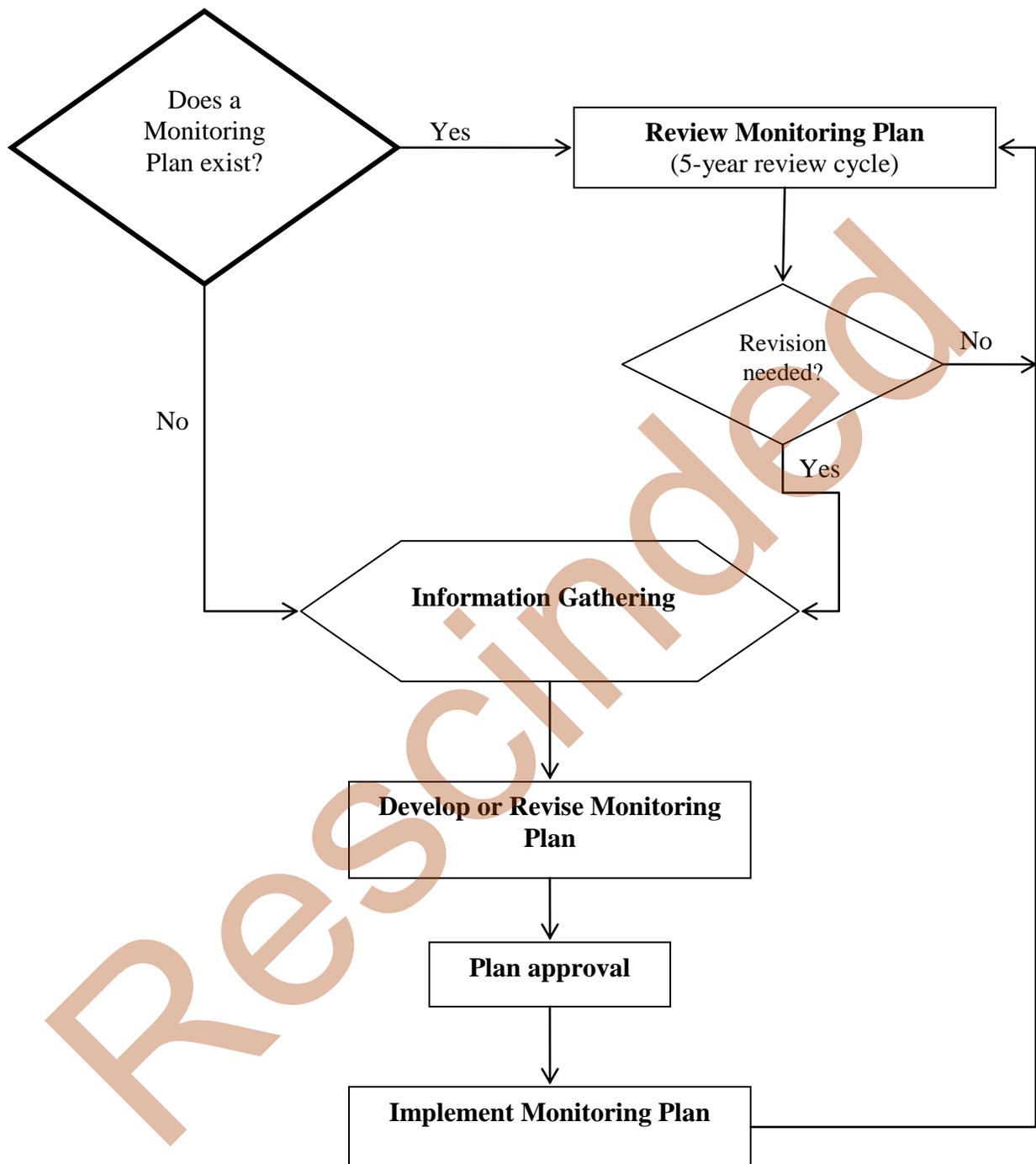


Figure 1 Process for developing, reviewing and implementing an ambient air monitoring plan.

2.0 Ambient Air Monitoring Program Design

An ambient air monitoring network is made up of the various monitoring sites that support one or more monitoring program(s) for an area. An ambient air monitoring program is a series of activities required to collect data for a specific purpose (objective) for a defined area. The purpose, design and operation of ambient air monitoring program(s) are documented in a comprehensive monitoring plan.

The first step in designing an ambient air monitoring program is to determine the monitoring objective(s) and the data quality objectives. An ambient air monitoring program should be designed so that the quality and quantity of data collected achieves the monitoring objectives.

The ambient air monitoring program design process described below should be followed to gather information and design a monitoring program. The design process is based on the Guidance on Systematic Planning Using the Data Quality Objectives Process (United States Environmental Protection Agency, 2006).

When designing or reviewing a regional ambient air monitoring program, Department staff may provide assistance with technical and regulatory information.

2.1 Steps in Gathering Planning Information

The steps in gathering information should be followed sequentially but any of the steps can be revisited when additional information becomes available. The steps in gathering information include:

- Step 1. Describe the ambient air quality or related deposition issue(s) in the geographic area of interest;
- Step 2. Identify the desired objective(s) of the ambient air monitoring program;
- Step 3. Identify information needed to meet the desired objective(s) of the ambient air monitoring program; and
- Step 4. Define boundaries of the ambient air monitoring program.

2.2 Describe the Ambient Air Quality or Related Deposition Issue(s)

MP 2-A The Alberta airshed shall (a) identify and (b) describe the ambient air quality or related deposition issue(s) in the area.

Clearly describing the issues that monitoring will address in the area, including the drivers that have or may have an impact on environmental conditions, will help identify the scope of the ambient air monitoring program.

2.3 Identify the Objective(s) of the Ambient Air Monitoring Program

Determining and articulating the monitoring objective(s) is fundamental in designing an ambient air monitoring program. The objectives will inform what needs to be monitored, how it needs to be monitored and how the data will be evaluated and reported. Some examples of ambient air monitoring programs can be found in the Ambient Air Monitoring Strategy for Alberta (Clean Air Strategic Alliance, 2009) and instrumentation specifications can be found in the AMD.

MP 2-B The Alberta airshed shall, at a minimum, identify the objective(s) of the ambient air monitoring program related to the ambient air quality or deposition issues for the area.

2.4 Identify Information Needed to Meet Objective(s) of the Ambient Air Monitoring Program

MP 2-C The Alberta airshed shall identify the information needed to meet the objective(s) of the ambient air monitoring program, including:

- (a) the number and location of monitoring sites;*
- (b) the substances to be monitored;*
- (c) monitoring duration and frequency; and*
- (d) instrumentation needed for monitoring.*

2.5 Define Boundaries of Ambient Air Monitoring Program

MP 2-D The Alberta airshed shall identify the geographical area for the monitoring program, including the ecosystem and/or population within that area.

MP 2-E The Alberta airshed shall identify the duration of the ambient air monitoring program(s).

The duration of a monitoring program may vary depending on the purpose and desired outcome of the program (e.g., a mobile unit may be used for a few months in order to investigate an air quality issue; a monitoring station may operate for the duration of the monitoring plan). If the duration of monitoring is dependent on the initial results of the monitoring, this should be indicated along with expected monitoring periods.

3.0 Ambient Air Monitoring Plan Development

The monitoring plan is documentation of monitoring program(s) proposed or in place. Alberta airsheds need to have a current and comprehensive monitoring plan on file with the Department. If the Alberta airshed identifies the need to make improvements to an existing ambient air monitoring program, the Alberta airshed is required to revise the existing monitoring plan.

When developing a monitoring plan or revising an existing plan, Department staff may provide assistance with technical and regulatory information.

The monitoring plan should include all aspects of the new or revised ambient air monitoring program(s).

- MP 3-A A monitoring plan shall include, at a minimum, the following information:*
- (a) description of the ambient air quality or related deposition issue(s) in the area as per MP 2-A;*
 - (b) responsible authorities for monitoring plan;*
 - (c) documentation of monitoring objective(s) as per MP 2-B;*
 - (d) the geographical area for the monitoring program, including the ecosystem and/or population within that area as per MP 2-D;*
 - (e) number and location of monitoring station(s) as per MP 2-C;*
 - (f) substance(s) to be monitored as per MP 2-C;*
 - (g) monitoring method(s), duration, frequency and instrumentation as per MP 2-C;*
 - (h) duration of the monitoring program(s) as per MP 2-E;*
 - (i) list of identified emission(s) sources;*
 - (j) list of identified receptors that may be affected by the emissions/deposition;*
 - (k) data management;*
 - (l) implementation timelines;*
 - (m) contingency plans or risk management for ongoing operations of the monitoring program;*
 - (n) monitoring schedule (if monitoring for less than 12 months per year);*
 - (o) date of last monitoring plan review conducted as per MP 6-A, MP 6-B, and MP 6-C; and*
 - (p) summary of findings from last monitoring plan review.*

Examples of the required content of a monitoring plan are provided in the Appendix and a monitoring plan template is provided on the AMD website. These are provided for guidance only. Information gathered for a monitoring plan can also be used to fulfill site documentation requirements in the Site Selection Chapter of the AMD.

A monitoring plan with a fixed term covering a maximum of five years is recommended to align with the required plan review cycle (see Figure 1 and MP 6-A).

MP 3-B When developing a monitoring plan, the Alberta airshed shall adhere to the requirements of the AMD for (a) monitoring site selection and (b) development of a Quality System.

4.0 Submission of Monitoring Plan or Revisions to Monitoring Plan

MP 4-A Alberta airsheds shall (a) sign, (b) date, and (c) submit an ambient air monitoring plan in accordance with the requirements of this Planning Chapter to the Director under any of the following circumstances:

- (i) for any existing monitoring;*
- (ii) for any changes to existing monitoring; and,*
- (iii) for any new monitoring.*

MP 4-B The Alberta airshed shall submit a proposed monitoring plan for any new ambient air monitoring program(s) to the Director at least 90 days prior to the start date of plan implementation.

MP 4-C The Alberta airshed shall submit proposed revisions to an existing monitoring plan to the Director at least 90 days prior to implementation of the revisions unless otherwise authorized in writing by the Director.

The Director will review and provide authorization to begin implementation of the new or revised monitoring plan.

When an Alberta airshed is submitting revisions to a monitoring plan, the revised section(s) should be identified and a revision history documented. It should be clear to the reviewer what changes have been made to the monitoring plan.

5.0 Ambient Air Monitoring Plan Implementation

Once the Alberta airshed submits a proposed monitoring plan and written authorization is received from the Director, plan implementation may proceed.

MP 5-A The Alberta airshed shall implement the new monitoring plan or revisions to an existing monitoring plan as authorized in writing by the Director.

MP 5-B The Alberta airshed shall (a) monitor implementation progress and (b) provide status updates on the progress of the implementation in MP 5-A to the Director

every six months following the implementation start date unless otherwise authorized in writing by the Director.

MP 5-C Implementation status updates in MP 5-B shall, at a minimum, include the following:

- (a) comparison of progress against the implementation timelines in the monitoring plan authorized by the Director; and*
- (b) all milestones achieved and any delays for the reporting time period.*

5.1 Inspections by Department Staff

Department staff may conduct an inspection on selected element(s) of implemented milestones for the reporting period.

MP 5-D Upon written request by the Director, the Alberta airshed shall provide the Director, or anyone acting on the Director's behalf, with access to monitoring station(s) for the purpose of inspecting the progress of implementation.

MP 5-E Upon written request by the Director, the Alberta airshed shall provide the Director, or anyone acting on the Director's behalf, with access to all information for the purpose of inspecting the progress of implementation.

6.0 Ambient Air Monitoring Program Review

The Alberta airshed must periodically review the ambient air monitoring program(s). The depth of the review will depend on the extent of changes required to the existing monitoring program.

- If new monitoring objectives are identified, a complete review of the monitoring program is done.
- A review may be needed as a result of change(s) in emissions and/or receptors in the area, changes in ambient air quality, changes in monitoring technology, audit results, or public concerns within the area monitored.
- If no change to the monitoring program and/or objectives is identified, no revision of the plan is needed.

This section outlines the requirements for regular and issue-driven ambient air monitoring program review.

MP 6-A The Alberta airshed shall review the ambient air monitoring program(s) every five years, unless required earlier by arising issues as determined by the Alberta airshed or the Director.

An Alberta airshed may at any time review an individual monitoring program within the ambient air monitoring plan. The review should commence by the end of the 5th year following a previous plan review or the 5th year after a new or revised monitoring plan has been fully implemented. The five year review referred to in MP 6-A includes a review of all ambient air monitoring programs in the Alberta airshed's ambient air monitoring plan.

MP 6-B The monitoring review in MP6-A must be conducted by a representative from the Alberta airshed and a monitoring review expert.

The monitoring review expert may be personnel of the Department or a third party, as determined by the Alberta airshed.

MP 6-C The Alberta airshed shall review the adequacy of the ambient air monitoring program(s) as per MP6-A with respect to the monitoring needs for the area as identified using the process outlined in this Planning Chapter.

MP 6-D The Alberta airshed shall notify the Department in writing of the findings of the monitoring review conducted as per MP 6-C.

MP 6-E The Alberta airshed shall revise the ambient air monitoring program(s) based on monitoring review findings of MP6-C.

A review of the ambient air monitoring program may be accompanied by a review of monitoring program operations. Review of monitoring program operations examines the business of running monitoring program(s) and should include review of resource efficiency and effectiveness, and evaluation of performance measures and business plans.

7.0 References

Alberta Environment 1989. Air Monitoring Directive, Monitoring and Reporting Procedures for Industry. 1989. Alberta Environment

Clean Air Strategic Alliance 2009. 2009 Ambient Air Monitoring Strategy for Alberta. Clean Air Strategic Alliance. 2009.

http://www.casahome.org/DesktopModules/Bring2mind/DMX/Download.aspx?Command=Core_Download&EntryId=187&PortalId=0&TabId=78

United States Environmental Protection Agency 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process (EPA QA/G-4). 2006. United States Environmental Protection Agency. <http://www.epa.gov/quality/qs-docs/g4-final.pdf>

Any comments, questions, or suggestions regarding the content of this document may be directed to:

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Original signed by: _____
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Date: August 3, 2016

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Appendix – Information to be Included in the Ambient Air Monitoring Plan

The following provides guidance/recommendations for what should appear in an ambient air monitoring program plan, as required by the Planning Chapter. The details in the numbered points provide examples.

- A. Description of the ambient air quality or related deposition issues(s) in the area.
- B. Responsible authorities for monitoring plan.
 1. Names, addresses and affiliations of contributors to development and implementation of monitoring plan
 2. Description of members' contribution to the monitoring plan process
- C. Documentation of monitoring objective(s).
- D. The geographical area for the monitoring program, including the ecosystem and/or population within that area.
- E. Monitoring location(s).
 1. Identify number of monitoring installation site(s)
 - Identify monitoring duration
 - Provide rationale for number and location of monitoring sites
 2. Identify monitoring location(s) using longitude and latitude
 3. Map of monitoring station location(s)
 4. Appropriate meteorological analysis
 - Wind roses using a minimum five years of data from the nearest representative station
 - For areas with no representative meteorological station, prognostic data (e.g. MM5) may be used to conduct analysis
 5. Identify land use (urban, industrial, rural) and note protected and/or sensitive area(s)
 6. Note any limitation(s) on access to monitoring site(s) e.g., all season, vehicle or personnel access
 7. Provide rationale for any siting criteria deviation(s) from AMD
 8. Provide rationale for the relocation or discontinuation of any monitoring
- F. Substance(s) to be monitored.
 1. Rationale for selecting substance(s)
 2. Historical monitoring data on substance(s), if available
 3. Source of historical monitoring data, if used
 4. Summary of modelling results if available
- G. Monitoring method(s), duration, frequency and instrumentation.
 1. Describe the monitoring method: instrumentation, detection limit, full scale, precision and accuracy
 2. Sampling frequency and duration

3. Rationale for choice of method
- H. Duration of the monitoring program(s).
1. Continuous
 2. Seasonal
 3. Intermittent
 4. Short- or long-term study
- I. Emission(s) sources.
1. List of identified emission source(s) from industrial and non-industrial
 2. Location of source(s)
 3. Emissions inventory, if available
 4. Source of emission inventory, if used
 5. Transboundary issues, if any
- J. List of identified receptors that may be affected by the emissions/deposition.
1. Describe which receptors are most sensitive
 - Identify receptor location(s) on monitoring location map (see 4c)
- K. Data management.
1. How long will the raw data be archived
 2. Where will the raw data be archived
 3. Quality System in place
 4. Method for additional data processing (if required)
 5. Party conducting QA/QC
 6. Method for managing the data versions
 7. Method for submission into centralized data warehouse
- L. Implementation timelines.
1. Monitoring site selection and preparation
 2. Timeframe to secure operator
 3. Timeframe to acquire any new equipment
 4. Equipment installation and testing
 5. Data collection
 6. All other milestones and completion dates
- M. Contingency plans or risk management for ongoing operations.
1. Monitoring site security and any theft
 2. Forest fire or wildlife intrusion
 3. Contract disruption
 4. Power failure, communication failure, etc.
- N. Monitoring schedule (if monitoring for less than 12 months per year).
1. Start and end date of monitoring (for each year, to a maximum of five years)
 2. Contingency plan if monitoring period requirements are not met

O. Date of last monitoring plan review.

P. Summary of findings from last monitoring plan review.

1. Any changes required to the plan required following the last review
2. Any changes implemented since last review

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