North Saskatchewan Region Air Zone
Canadian Ambient Air Quality Standards Response
Government of Alberta Action Plan

September 2017

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

Operations Division
Alberta Environment and Parks
Twin Atria Building
4999 98 Avenue
Edmonton, Alberta, Canada T6B 2X3
Website: AEP.alberta.ca

Date of Publication: September 2017

ISBN 978-1-4601-3593-8 (PDF)

Air Quality Management System

The Air Quality Management System (AQMS) provides a comprehensive, cross-Canada framework for collaborative action to further protect human health and the environment through continuous improvement of air quality. The Air Zone Management Framework, a component of the AQMS, provides a system for the management, monitoring and reporting actions to be implemented at an air zone level. The first Canadian Ambient Air Quality Standards (CAAQS) assessment results for Alberta were published in September 2015 for the 2011 to 2013 monitoring period - *Alberta: Air Zones Report 2011-2013*.

Alberta is committed to implementing the national Air Quality Management System, including taking action to reduce emissions, as required, in each air zone to meet the CAAQS requirements. Alberta Environment and Parks developed and published the *Alberta Implementation of the Air Zone Management Framework for Fine Particulate Matter and Ozone* in September 2015. In addition to providing information on air zone boundaries and monitoring stations used for CAAQS reporting, the policy sets management planning requirements and timelines. Air zones in the orange and red management levels are required to develop a management plan to achieve CAAQS and/or further improve ambient air quality within two years of CAAQS reporting.

In addition to this report, the *North Saskatchewan Air Zone Canadian Ambient Air Quality Standards Government of Alberta Action Plan*, the *Capital Region Fine Particulate Matter Response* was developed in close collaboration with stakeholders over two years and released in December 2014. The *Capital Region Fine Particulate Matter Response* was developed in response to an exceedance of the Canada-wide Standard for fine particulate matter (the national standards prior to CAAQS) at Edmonton Central and Edmonton East air quality monitoring stations for the 2008 to 2010, 2009 to 2011, and 2010 to 2012 assessments.

Current Assessment

The annual Air Zones Report summarizes the CAAQS achievement status and management levels for Alberta's Air Zones for fine particulate matter ($PM_{2.5}$) and ozone (O_3) monitoring results. Fourteen stations in the North Saskatchewan Region (NSR) air zone were used in the 2011 to 2013 assessment. These stations are located within communities or in areas accessed by members of the public. The boundaries of the NSR air zone and the locations of the ambient air quality monitoring stations are shown in Figure 1.

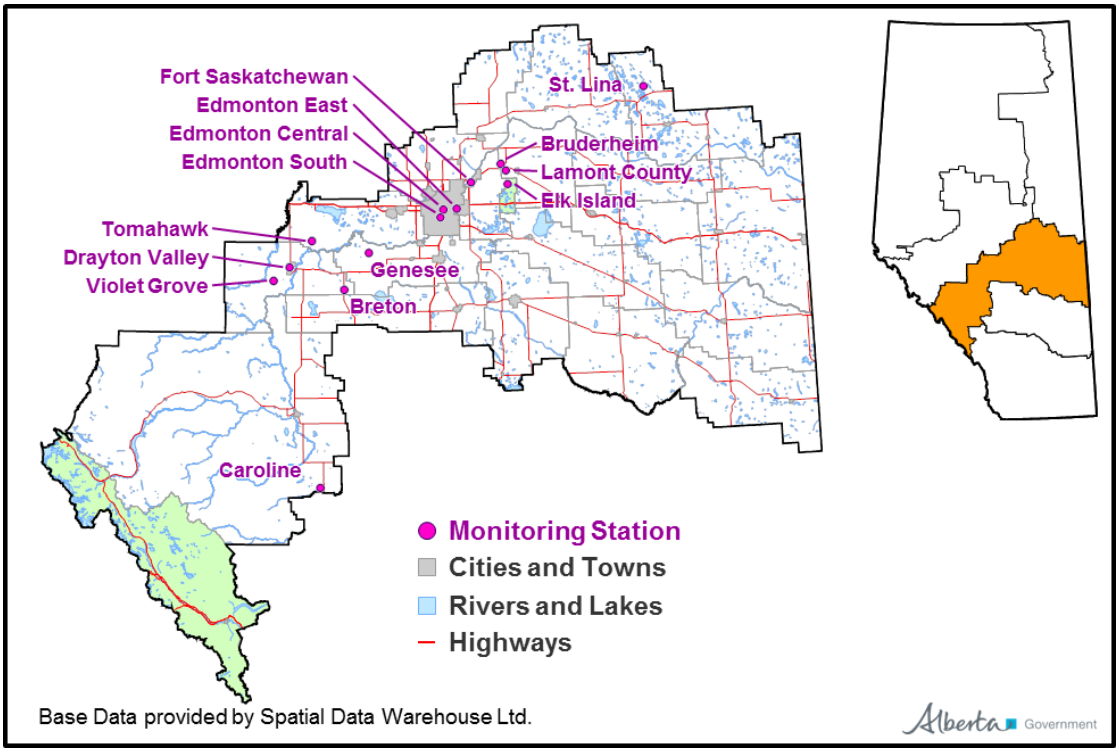


Figure 1 – North Saskatchewan Region Air Zone Boundaries and Monitoring Stations used for AQMS Reporting.

A summary of the 2011-2013 reporting period assessment results for the NSR air zone is provided in Table 1. The Bruderheim, Drayton Valley, Edmonton Central, Edmonton East, Edmonton South, Fort Saskatchewan, and Lamont County stations were assigned to the orange management level for $PM_{2.5}$, Actions for Preventing CAAQS Exceedance. As such, the zone was assigned to the orange management level for $PM_{2.5}$ indicating that $PM_{2.5}$ concentrations are approaching CAAQS and proactive action is needed to prevent exceedance.

The Bruderheim, Genesee, and Lamont County stations were assigned to the orange management level for O_3, Actions for Preventing CAAQS Exceedance. Therefore, the NSR air zone is assigned to the orange management level for O_3, Actions for Preventing CAAQS Exceedance. This management level indicates that O_3 concentrations are approaching CAAQS and proactive action is needed to prevent exceedance.

Table 1: Air Quality Results for the North Saskatchewan Region Air Zone

Air Zone	Station	$PM_{2.5}$ 24-hour	$PM_{2.5}$ Annual	Ozone 8-Hour
North Saskatchewan	Breton	-*	-*	
	Bruderheim			
	Caroline			
	Drayton Valley			-*
	Edmonton Central			
	Edmonton East			
	Edmonton South			
	Elk Island			
	Fort Saskatchewan			
	Genesee			
	Lamont County			
	St. Lina			
	Tomahawk			
	Violet Grove	-*	-*	

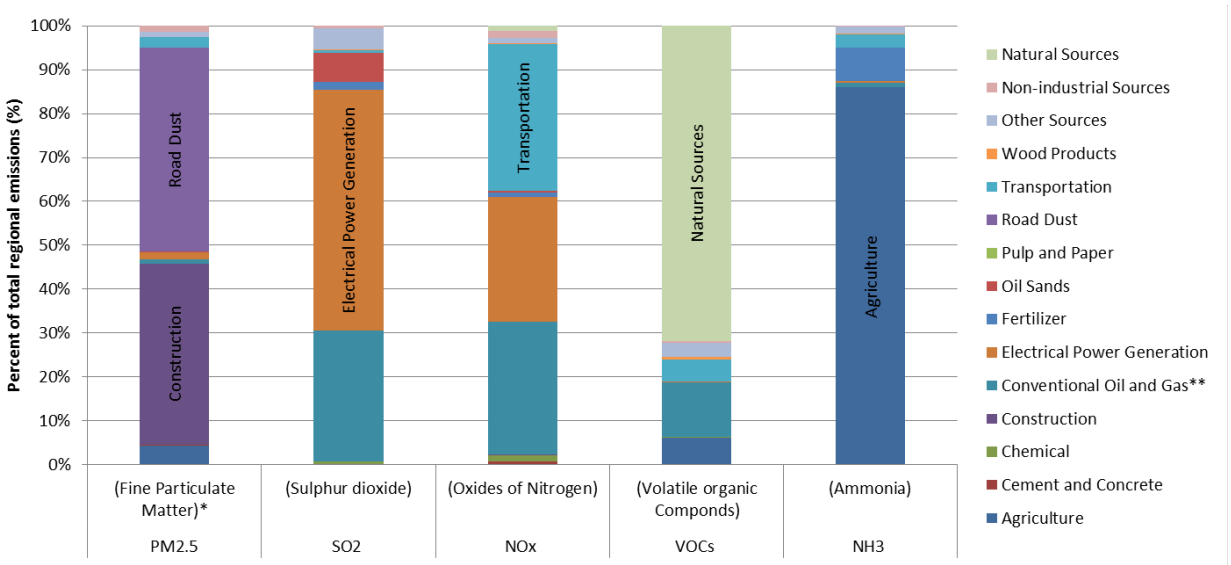
***** No assessment is possible because as the substance is not monitored at this station
Green, yellow, orange and red correspond to the CAAQS management levels.

Emissions

Figure 2 shows emissions of selected pollutants, showing percent of total emissions by sector for the NSR air zone. This is based on the Alberta Air Emissions Inventory. While these data are a few years old, they represent the most consistent and detailed emissions inventory dataset available for all the air zones, including non-industrial non-point sources[1], and small sources.

Road dust and construction contribute the vast majority of primary $PM_{2.5}$ emissions in the NSR air zone. Smaller contributions of primary $PM_{2.5}$ are from the agriculture and transportation sectors. The electrical power generation sector followed by the conventional oil and gas sector (71% of conventional oil and gas emissions from upstream sources, 29% from downstream sources) are the dominant emitters of sulphur dioxide (SO_2) in the NSR air zone. The transportation sector followed by the conventional oil and gas sector (85% of conventional oil and gas emissions from upstream sources, 15% from downstream sources) and the electrical power generation sector account for the vast majority of nitrogen oxides (NO_x) emissions in the NSR air zone. Natural sources are the dominant source of volatile organic compounds (VOCs) in the NSR air zone, with small contributions from conventional oil and gas (88% of conventional oil and gas emissions from upstream sources, 12% from downstream sources), agriculture and transportation. Ammonia (NH_3) emissions contributions in the NSR air zone are dominated by the agricultural sector. Figure 2 indicates that non-point sources dominate the primary $PM_{2.5}$ emissions and are also significant contributors to NO_x and VOCs (these substances contribute to the formation of secondary $PM_{2.5}$).

[1] Non-point source pollution is subtle and gradual, caused by the release of pollutants from many different and diffuse sources (aggregated sources of emissions). This aggregation is done because the emission sources are either too small and numerous, too geographically dispersed, or too geographically large to be estimated or represented by a single point.



*Primary particulate matter emissions
**Conventional oil and gas includes both upstream and downstream oil and gas

Figure 2: Percent of Total Emissions by Sector for the North Saskatchewan Region Air Zone

Government of Alberta Commitment to Improve Air Quality in North Saskatchewan Region Air Zone

As the NSR air zone has been assigned to the orange management level for $PM_{2.5}$ and O_3 CAAQS, a management plan is outlined, as follows. Note, however, that several of the policies and management actions listed can apply provincially to improve protection of air quality.

Alberta Environment and Parks is committed to continue working with stakeholders to implement management actions identified in this plan as well as the *Capital Region Fine Particulate Matter Response* to effectively meet the CAAQS in the NSR air zone. Alberta Environment and Parks will undertake action in the following areas to reduce air emissions.

Regional Planning Actions:
The Government is committed to an Integrated Resource Management System (IRMS). Regional planning and related initiatives under the Land-use Framework are components of this system. IRMS is based on the principles of cumulative effects management – the management of the combined effects of past, present, and foreseeable future activities on the environment, economy, and society over time and in a particular place. The IRMS will support responsible resource management in the province, in part through the implementation of environmental management frameworks. CAAQS and their associated air zone management threshold are being incorporated into air quality management frameworks and provide context for development and related planning and decision-making processes in each land use region.

Each regional plan is at a different stage of development. Alberta Environment and Parks will continue to advance air quality management frameworks developed within each region.

Action	Description
Develop and implement a regional land-use plan and associated air quality management framework.	The North Saskatchewan Regional Plan (NSRP) and the North Saskatchewan Region Air Quality Management Framework are currently under development.
Continue implementing the Capital Region Air Quality Management Framework.	The Capital Region Air Quality Management Framework was developed by a multi-stakeholder committee and released in June 2012 to support management of air quality within the Capital Region and Industrial Heartland in the interim of the release of the North Saskatchewan Air Quality Management Framework. The Framework is currently being implemented in collaboration with an oversight advisory committee that meets quarterly.
Continue implementing the Capital Region Fine Particulate Matter Response.	In the Capital Region, a management plan for fine particulate matter was developed with municipalities, industry, local airshed organizations, and the provincial government in 2013 in response to an exceedance of the Canada-wide Standards (CWS) for fine particulate matter for the 2008-2010, 2009-2011, and 2010-2012 assessments. This management plan was published as the *Capital Region Fine Particulate Matter Response.* The management response plan is currently being implemented in collaboration with an oversight advisory committee that meets quarterly.

Policy Actions:
In addition to the Alberta Implementation of the Air Zone Management Framework for Fine Particulate Matter and Ozone policy defining requirements to ensure the CAAQS are achieved, Alberta is assessing additional policies that can be applied in air zones at orange and red CAAQS management levels. While some of these actions may not be directly applicable to the NSR air zone, pollution can be transported long distances, so action taken in one air zone may lead to air quality improvements in others as well. Technology and equipment standards and policy for point sources such as large industry and non-point sources such as transportation will be assessed.

Action	Description
Establish provincial air emission policy, including defining standards / tools to apply to reduce emissions in air zones at orange and red CAAQS management levels.	Jurisdictional review has been completed and published online. Based on the jurisdictional review of international policy approaches and regulatory tools applied in areas requiring air quality management, the Government of Alberta will subsequently identify policy gaps and develop tools for air zones at orange and red CAAQS management levels.
Establish and update source standards for both industrial sectors and equipment to reduce emissions	Coal-fired power plants are some of the major polluters in Alberta, and their emissions can impact air quality across the province. Requiring the electricity generating sector (existing coal-fired

	units) to meet the Alberta emission management framework standards for sulphur dioxide and nitrogen dioxide to significantly lower fine particulate matter precursor gases. Alberta's Climate Leadership Plan will phase out coal-fired electricity sources by 2030. Provincial roll out of more stringent equipment standards for new boilers and heaters.
Reduce methane emissions in Alberta under the Climate Leadership Plan.	Reduction in methane emissions will have co-benefits in improving air quality. In Alberta, the government's current initiative to reduce methane by 45% from the oil and gas industry by 2025 will have a co-benefit of also reducing VOCs, precursors to particulate matter and ozone, from these sources.
Action on non-point sources such as transportation.	The Government is collaborating with industry, non-government organizations, and airsheds cross-provincially through the Clean Air Strategic Alliance (CASA) to provide recommendations for potential management actions on non-point source emissions such as transportation and wood burning. The Government continues to support the development of green transit alternatives and continues to collaborate with federal/provincial/territorial jurisdictions through the Canadian Council of Ministers of the Environment (CCME) Mobile Sources Working Group to help inform further transportation management actions in Alberta.
Provide support and guidance to assist municipalities when making decisions on land-use planning for improved environmental outcomes.	Emissions from municipalities include sources such as vehicles, home-heating furnaces, backyard fire pits, and small engines such as lawn mowers. Provide technical support to municipalities for their planning, by-law development and public education efforts to reduce air emissions.
Better understand contributions from small businesses and manufacturing that do not require an Environmental Protection and Enhancement Act approval to the fine particulate matter issue.	Assess contributions from small businesses and manufacturing to better inform what impacts these have on air quality and help identify partners and promote collaboration.
Update Alberta Ambient Air Quality Objectives	Updates to Objectives for fine particulate matter, ozone, nitrogen dioxide, sulphur dioxide, and hydrogen sulphide and potential new Objective for total reduced sulphur compounds are planned over the next few years.

Regulatory Process Actions:
Industrial facilities in Alberta regulated by the *Environmental Protection and Enhancement Act* operate under the terms and conditions stipulated in their respective approval documents, which include emission control standards. These standards are updated when the facility approval are renewed on a 10-year cycle. Efforts are ongoing to ensure principles of continuous improvement are incorporated into the approval process to support environmental outcomes. The Government of Alberta is committed to taking actions to reduce emissions from existing sources and requiring control technologies on par with leading jurisdictions for major new sources.

Action	Description
Action on industrial emissions.	Industrial approvals in Alberta are normally issued for a ten-year period. The Alberta Energy Regulator and Environment and Parks are requesting more stringent emissions standards be applied to all the industrial sources in renewal applications that are in air zones at orange and red CAAQS management levels. Data and information on current operations, management practices and technologies be collected.
Develop and implement the Industrial Air Emissions Management Program (IAEMP)	Develop and deliver an industrial survey as part of the Industrial Air Emissions Management Program to EPEA approval holders in the North Saskatchewan and Red Deer Air Zone regions to better understand current equipment and control technologies to reduce NO_x emissions and manage fine particulate matter formation. The data collected from the program is intended to inform the approval process and management decisions (i.e. current gaps, policy renewal, policy development, etc.).Data from participating facilities to be submitted to Alberta Environment and Parks in 2018.
Include framework and program participation clauses.	Continue to include regional clauses outlining participation in implementing the Capital Region Air Quality Management Framework and any programs or management plans developed under the framework into approvals. Clauses will be included in approvals of new facilities and facilities undergoing amendment or renewal.
Develop guidance document to support NO_x emissions reduction plan clauses.	Engage with Approvals and stakeholders to develop an outline of a guidance document to support approval clauses requesting a NO_x emission reduction plan.

Knowledge Improvement:
Currently, Alberta has the largest network of air monitoring stations in Canada. All population centres of over 50,000 people, as well as some smaller centres have at least one continuous air monitoring station, and this network is being expanded. Alberta Environment and Parks will work with local airshed organization and other partners to advance the knowledge in the priority areas and inform management approaches.

Action	Description
Photochemical modelling	Interpret Phase 3 CMAQ Secondary Fine Particulate Matter modelling results; identify next steps based on priorities, and outline workplan to continue improving modelling outcomes.
Speciation Monitoring	Understand the origins and chemical speciation of fine particulate matter in the North Saskatchewan Air Zone
Ambient data analysis	Analyze available ground level ozone monitoring data to investigate the possible cause or influences on the occurrence of orange management level assignment. Analyze available fine particulate matter monitoring data to investigate the possible cause or influences on the occurrence of orange management level assignment. Investigate links to meteorology (wind speed/wind direction, atmospheric structure, temperature, etc.), topography and covariance between pollutants. Identify any temporal and spatial long term trends.

Engagement Actions:
Air quality management is multi-faceted requiring the participation of numerous affected people, industries, and agencies. There are two aspects to engagement actions. The first is in recognizing the work with stakeholders to achieve a better understanding of regional priorities to pursue appropriate management initiatives aligned with regional needs. The second is focused on outreach and education to inform the public and stakeholders on the state of air quality, how it impacts them, and what they can do the help.

Action	Description
Develop a provincial air literacy program.	Update and develop air literacy content and materials for public outreach (i.e. social media campaigns to encourage being idle free, alternative transportation modes, fuel efficiency, vehicle maintenance etc.)
Continue stakeholder consultations with existing advisory committees.	Ongoing quarterly meetings with existing multi-stakeholder stakeholder oversight committees to implement the Capital Region Air Quality Management Framework and Fine Particulate Matter Response.

Additional Information

Information on the national Air Quality Management System, of which the CAAQS are a part, can be found on the Canadian Council of Ministers of the Environment website at:

- http://www.ccme.ca/en/resources/air/aqms.html

Information on Alberta's Implementation of the Air Zone Management Framework for Fine Particulate Matter and Ozone can be found at:

- http://aep.alberta.ca/air/management-frameworks/canadian-ambient-air-quality-standards/default.aspx

The 2011-2013 ambient air quality report for air zones, fact sheets on the results for the Red Deer and other zones can be found at:

- http://aep.alberta.ca/air/management-frameworks/canadian-ambient-air-quality-standards/default.aspx

Historical information on the management of $PM_{2.5}$ and ozone in Alberta before the CAAQS, which was based on the Canada-wide Standards, including the results of the assessments for the 2010-2012 and earlier periods, can be found at:

- http://aep.alberta.ca/air/management-frameworks/canadian-ambient-air-quality-standards/default.aspx

Information on the Capital Region Fine Particulate Matter Response can be found at:

- http://aep.alberta.ca/land/cumulative-effects/regional-planning/capital-region/capital-region-cumulative-effects-management.aspx