BRITISH COLUMBIA | Ministry of Environment

NORTHEAST AIR ZONE REPORT (2011-2013)

OVERVIEW

This is the first air quality report for the Northeast Air Zone, which covers the northeast corner of B.C., including Fort St. John, Dawson Creek, North Rockies Regional Municipality (Fort Nelson), Tumbler Ridge, Chetwynd and Taylor. Air zone reports are a commitment under the national Air Quality Management System (AQMS) to annually report on the achievement of the Canadian Ambient Air Quality Standards (CAAQS) for ground-level ozone and fine particulates ($PM_{2.5}$).

Over the current reporting period of 2011 to 2013, ozone and $PM_{2.5}$ were not monitored on a continuous basis. As a result, achievement of the CAAQS for these two pollutants is yet to be determined. Data from a new air monitoring station in Ft. St. John will be reported on in future air zone reports.

The Air Zone Management Framework defines colour-coded management levels associated with air quality. Air zone management levels for ozone and $PM_{2.5}$ will be assigned when at least two years of data have been collected in this air zone.

1. Introduction

Fine particulates ($PM_{2.5}$) and ground-level ozone are considered among the most important outdoor air pollutants from a public health perspective. Both pollutants are key components of urban smog and associated with short-term and long-term impacts on human health and the environment.

In 2012, the Canadian Council of Ministers of the Environment committed to implementing a new comprehensive air management system designed to better protect human health and the environment. The Air Quality Management System (AQMS) is comprised of the following key elements:

- Canadian Ambient Air Quality Standards (CAAQS) for $PM_{2.5}$ and ozone, to drive air quality improvements,
- Base-Level Industrial Emission Requirements (BLIERS) for major industries to set a consistent level of good performance across Canada,
- Air zone management that supports actions to improve air quality and keep clean areas clean,
- Enhanced coordination where air pollution crosses jurisdictional borders, and
- Increased collaboration on actions to reduce transportation emissions

Under AQMS, air zones are the basis for monitoring, reporting and taking action on air quality. Air zones are areas that exhibit similar air quality characteristics, issues and trends. Individual provinces and territories are responsible for delineating and managing their air zones based on local conditions. The level of response is expected to be proportional to the level of air quality degradation. As outlined in the *Air Zone Management Framework*, air quality is assigned to one of four colour-coded management levels (i.e. red, orange, yellow and green), with recommended actions associated with each level.

Table 1. Air Zone Management Framework

Management Level	Ozone Daily max 8h (ppb)		$PM_{2.5}$ Annual ($\mu g/m^3$)		$PM_{2.5}$ 24h ($\mu g/m^3$)	
	2015	**2020**	**2015**	**2020**	**2015**	**2020**
Red	Actions for Achieving Air Zone CAAQS					
Threshold (CAAQS)	63	62	10	8.8	28	27
Orange	Actions for Preventing CAAQS Exceedance					
Threshold	56		6.4		19	
Yellow	Actions for Preventing Air Quality Deterioration					
Threshold	50		4		10	
Green	Actions for Keeping Clean Areas Clean					

Under the AQMS, provinces and territories are expected to report on CAAQS achievement. This includes the assignment of a colour-coded management level to each air zone, based on the highest concentrations within the air zone, and a summary of actions being taken to protect local air quality.

As part of the province's commitments under AQMS, B.C. has been divided into seven broad air zones as shown in Figure 1. This document represents the first annual report for the Northeast Air Zone. The summarized data are also provided in a map-driven web-based format via Environmental Reporting BC at: http://www.env.gov.bc.ca/soe/indicators/air.

Figure 1. B.C. air zones under AQMS.

2. Northeast Air Zone

The Northeast Air Zone covers the northeast corner of B.C. It is lightly populated compared to more southerly regions, but includes some of the fastest growing areas of the province. Fort St. John is the largest community (21,523)), followed by Dawson Creek (12,653), North Rockies Regional Municipality/Fort Nelson (5,440) and Tumbler Ridge (2,973).[1]

Distinct from the rest of the province, the Northeast Air Zone is characterized by rolling hills and a continental climate with low annual precipitation rates. It is the centre of the growing oil and gas industry in B.C. The industry is spread throughout the air zone, with emission sources including gas plants (condensate tanks, gas processing facilities and compressor stations), construction activity, dehydrators, vehicles, engines and venting and flaring. The highest density of gas plants in the air zone is within a 60

Figure 2. Northeast Air Zone

[1] http://www.bcstats.gov.bc.ca/StatisticsBySubject/Demograph

km wide band along the Alberta border that includes Fort St. John, Taylor, Dawson Creek and Pouce Coupe.

Other major sources of air contaminants include the coal mines near Tumbler Ridge and Chetwynd ($PM_{2.5}$), the West Fraser Mill in Chetwynd (volatile organic compounds) and an oriented strand board mill (formaldehyde) near Fort St John. Other locally important emission sources include wood combustion (e.g. residential wood stoves and open burning) and on- and off-road vehicle emissions. Wildfires are an intermittent source of $PM_{2.5}$ emissions during the warmer months.

3. Ozone Levels

Ozone was not routinely monitored in the Northeast Air Zone between 2011 and 2013. Short-term monitoring studies conducted in Toms Lake, Groundbirch, Rolla and Farmington in 2010 and in Kelly Lake in 2011 found maximum 8-hour concentration not exceeding 58 ppb and below the level of the national standard of 63 ppb, which is based on a 3-year average of the 4th highest annual value. As these measurements provided only a snapshot of local air quality conditions, a more fulsome assessment is not possible. Beginning in 2015, a fully instrumented air quality station in Fort St. John will begin reporting real-time ozone measurements that will be available on www.bcairquality.ca.

> Ozone is a secondary pollutant formed from reactions involving nitrogen oxides (NOx) and volatile organic compounds (VOCs) in the presence of sunlight.

4. $PM_{2.5}$ Levels

During the reporting period from 2011 to 2013, no continuous $PM_{2.5}$ measurements were available from monitoring sites in the Northeast Air Zone. Hence, achievement of the national standards cannot be reported at present.

Non-continuous measurements conducted over a 24-hour period every six days were available for two sites in Dawson Creek (Frank Ross Elementary School and South Peace Senior Secondary School) and one site in Tumbler Ridge. Measurements are plotted in Figure 3. Between 2012 and 2013, the CAAQS level of 28 $\mu g/m^3$ (24-hour) was not exceeded at either of the sites in Dawson Creek, but was exceeded over one 24-hour period in Tumbler Ridge in 2012.

> $PM_{2.5}$ refers to inhalable particles up to 2.5 micrometres in diameter but of varying size, shape and chemical composition. This makes $PM_{2.5}$ a challenge to measure. The TEOM instruments were the first used in B.C. that could measure $PM_{2.5}$ concentrations in real-time. These instruments heated the sample air to remove excess water, and in the process, lost some of the sample due to evaporation. New monitors (the "FEMs") provide a more complete measure by accounting for the $PM_{2.5}$ that was previously lost to evaporation. As a result, higher concentrations are expected with the new monitors, even though actual air quality has not changed.

Annually averaged $PM_{2.5}$ concentrations (2012-2013) of 4.3 µg/m^3 were reported at Frank Ross Elementary and 5.7 µg/m^3 at the South Peace Secondary School. These levels were well below the national standard of 10 µg/m^3. There was insufficient data to determine an annual average concentration at Tumbler Ridge.

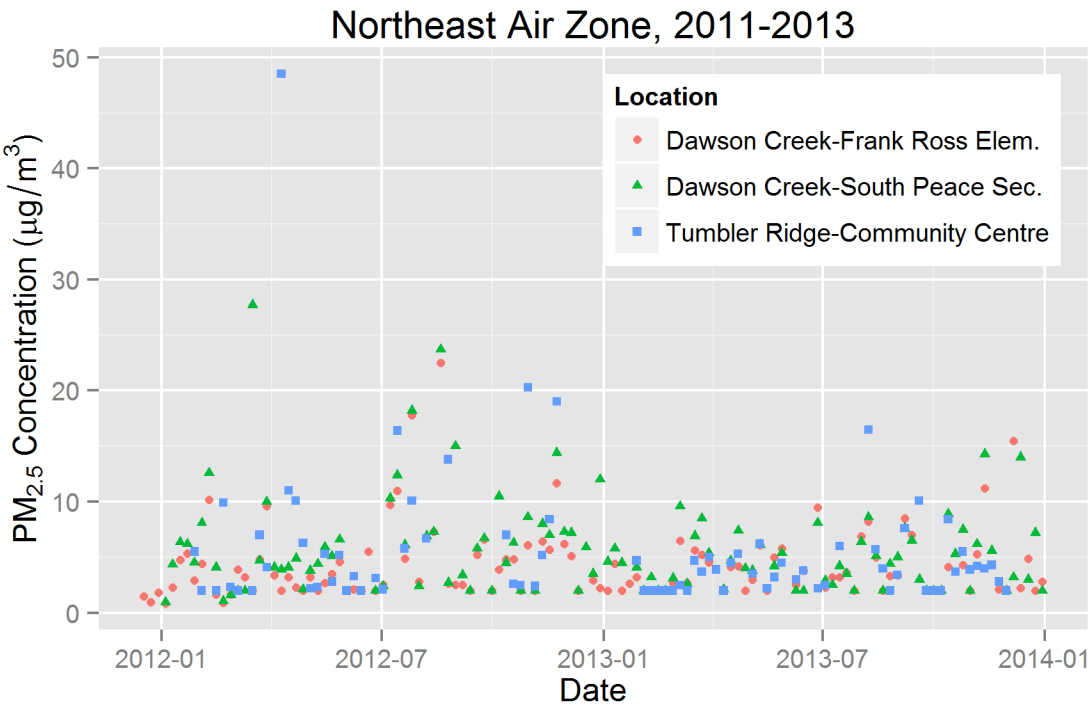

Figure 3. $PM_{2.5}$ concentrations in the Northeast Air Zone (2011-2013), based on 24-hour Partisol measurements, typically conducted every one-in-six days.

5. Air Zone Management

Air zone management levels are assigned on the basis of the highest concentrations within an air zone, excluding contributions from transboundary flows and exceptional events such as wildfires. Due to the lack of continuous monitoring data in this air zone over the reporting period of 2011 to 2013, ozone and $PM_{2.5}$ management levels have yet to be determined for the Northeast Air Zone. Non-continuous monitoring in Dawson Creek suggests that on the basis of annual $PM_{2.5}$ levels in this community, a "yellow" management level would be assigned. This indicates that actions to prevent future air quality deterioration may be appropriate.

6. Actions to Protect Air Quality

The BC Ministry of Environment issues *Environmental Management Act (EMA)* discharge permits for industrial operations, including oil and gas operations that require National Energy Board (NEB) approval. The BC Oil and Gas Commission issues *EMA* discharge permits for all oil and gas facilities that do not require NEB approval. The OGC administers the *Oil and Gas Waste Regulation* and produces guidelines for oil and gas operations that consider air discharges as appropriate. Through its *Flaring and Venting Reduction Guideline*, the OGC provides regulatory requirements and guidance for flaring, incinerating and venting in B.C. and supports the province's goal to eliminate all routine flaring at oil and gas producing wells and production facilities by 2016.

Oil and gas activity has resulted in increasing public concerns about potential health impacts of air emissions such as sulphur dioxide, total reduced sulphides, volatile organic compounds and oxides of nitrogen. To address this, the B.C. Government is partnering with the oil and gas sector on the Northeast Air Monitoring Project to increase our knowledge of ambient concentrations of pollutants related to the sector (see: http://www.bcairquality.ca/readings/northeast.html). A parallel study, the 2015 Human Health Risk Assessment of Oil and Gas Activities in Northeastern BC, recommended a number of actions to address public health concerns, including air quality monitoring and reporting. For more information on the Human Health Risk Assessment, see: http://www.health.gov.bc.ca/protect/oil-gas-assessment.html.