



Air Quality in 100 Mile House

A Summary of Recent Trends in Levels of
Particulate Matter

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Executive Summary

This report provides a summary of recent trends in the levels of particulate matter (PM₁₀ and PM_{2.5}) in 100 Mile House. Data were obtained using non-continuous monitors located at the BC Access Centre.

Key points for 2011:

- Both PM_{2.5} provincial objectives were met at the BC Access Centre in 2011.
- In 2011, the number of days for which measured 24-hour average PM_{2.5} concentrations were greater than 25 µg/m³ is zero.
- In 2011, the number of days for which measured 24-hour average PM₁₀ concentrations were greater than 50 µg/m³ is zero.
- PM₁₀ exceedances or high values of PM_{2.5} cannot be ruled out for days on which sampling did not occur.
- Increase in sampling frequency in 2011 did not lead to an increase in the number of measured exceedances of PM₁₀ or high values of PM_{2.5}.

1 Introduction

The Ministry of Environment (MoE), in collaboration with industrial stakeholders, maintains and operates the air quality and meteorological monitoring network in 100 Mile House, BC. This report evaluates the recent trends in PM_{2.5} (fine particulate matter or particulate matter with aerodynamic diameter less than 2.5 microns) and PM₁₀ (particulate matter with aerodynamic diameter less than 10 microns).

Sources of PM_{2.5} include but are not limited to industries, wood stoves, motor vehicles and forest fires. Due to topography, 100 Mile House and many other interior communities in BC are susceptible to high levels of PM_{2.5} during inversions. High levels of PM_{2.5} are associated with a range of adverse health effects, predominantly to the respiratory and cardiovascular systems. Research has not identified thresholds below which adverse effects do not occur and both short-term and long-term exposures have been found to be associated with adverse health effects¹.

Another pollutant that is monitored in 100 Mile House is PM₁₀. Significant sources of PM₁₀ include winter traction material, dust from unpaved roads and unvegetated surfaces, and emissions from the wood processing industries. Generally, elevated PM₁₀ levels occur during late winter/early spring when loose winter traction material becomes exposed on road surfaces. While measurements of PM₁₀ include PM_{2.5}, the main causes behind PM₁₀ exceedances are not the same as the causes behind PM_{2.5} exceedances.

2 Air Quality Monitoring Network

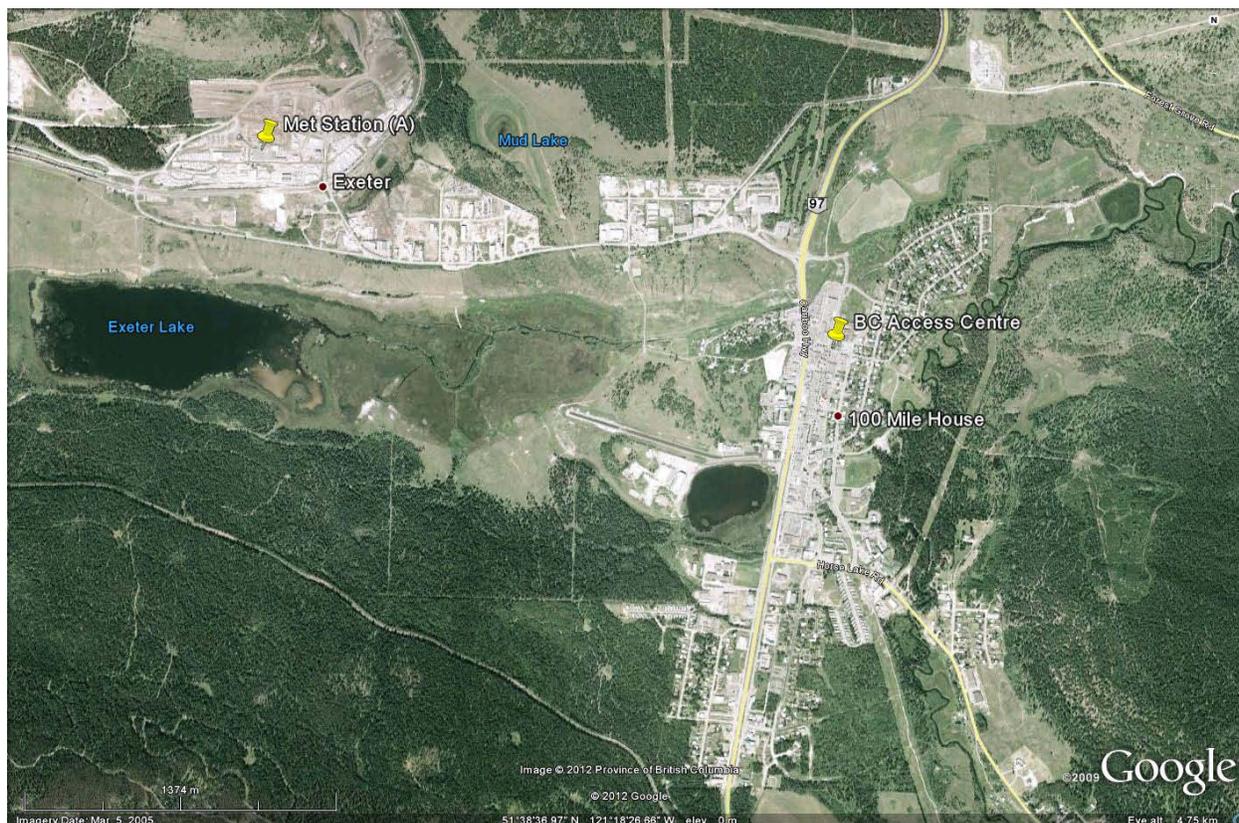
The MoE monitoring network in 100 Mile House includes one non-continuous monitoring station located at the BC Access Centre and one meteorological station at Ainsworth Ltd (Figure 1).

2.1 Data Completeness Criteria

PM_{2.5} and PM₁₀ data are collected for 24-hours (midnight to midnight) one in every six days on National Air Pollution Surveillance (NAPS) Program schedule. Since April 2011, additional 24-hour sampling has been conducted between scheduled NAPS days to obtain more data points per year. Valid data must be available for at least 75% of the scheduled days in each quarter of a calendar year to satisfy data completeness criteria. Missing data generally result from instrument failure. If a significant fraction of data is missing in a given year, a bias in annual statistics is possible.

¹ WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide. Global update 2005. Summary of risk assessment. WHO/SDE/PHE/OEH/06.02

Figure 1: Air quality and meteorological monitoring stations in 100 Mile House



3 Recent Trends

This section includes a summary of recent trends in the levels of ambient PM_{2.5} and PM₁₀.

3.1 PM_{2.5}

There are two provincial objectives for PM_{2.5} - a 24-hour objective and an annual objective (Table 1). A summary of yearly PM_{2.5} data is provided in Table 2 including sample size, annual mean, 98th percentile and the number of days for which a 24-hour average concentration exceeded 25 µg/m³. The increased sampling frequency in 2011 did not show an increase in the number of days for which a 24-hour average concentration exceeded 25 µg/m³. However, higher levels of PM_{2.5} cannot be ruled out for days when sampling did not occur. The PM_{2.5} annual mean has met the provincial objective since 2006 (Table 2). The 24-hour provincial objective for PM_{2.5} was not met in 2010 due to the impact of forest fires that led to significantly higher levels of PM_{2.5} in the Cariboo region. In 2011, both PM_{2.5} provincial objectives were met. It must be noted that data completeness criteria were not satisfied in 2009 and 2010.

However, we do not expect a significant bias in annual statistics due to the missing data. Figure 2 shows the trends in the 98th percentile and the annual mean.

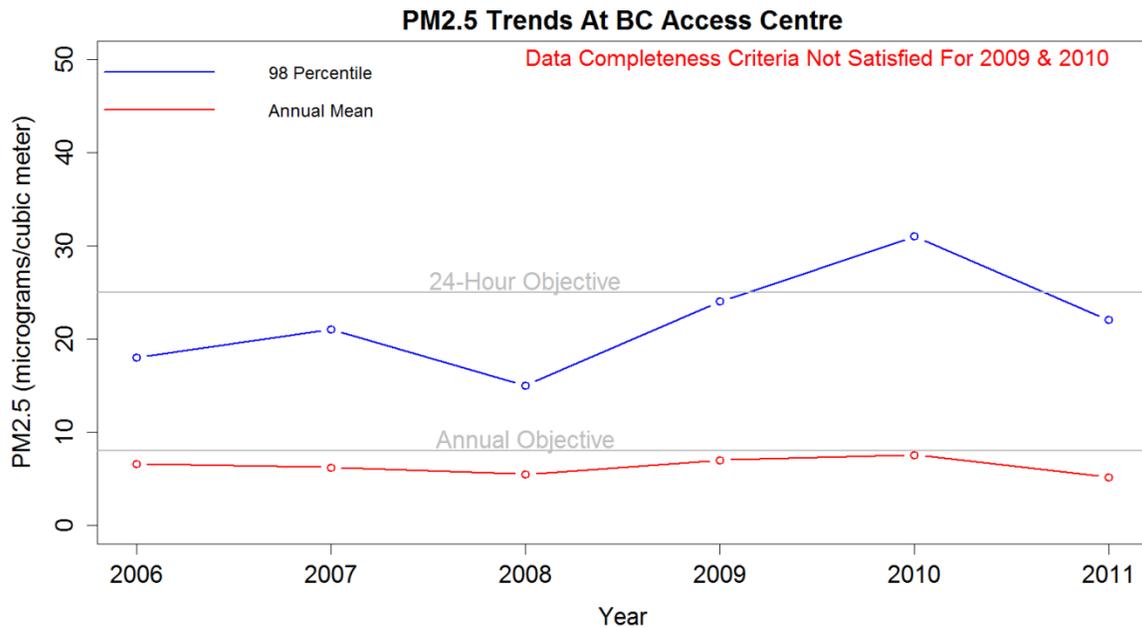
Table 1: PM2.5 Provincial Objectives

PM _{2.5} Objective/Goal Type	PM _{2.5} Objective/Goal (µg/m ³)
24-hour Objective ¹	25
Annual Objective (annual mean)	8
¹ Based on annual 98 th percentile value	

Table 2: Summary of PM_{2.5} means, 98th percentile and exceedances

Year	No. of sampled days	Annual Mean (µg/m ³)	Annual 98 th percentile (µg/m ³)	Number of obs. above 25 µg/m ³
2006	64	7	18	1
2007	58	6	21	0
2008	56	5	15	1
2009	40	7	24	0
2010	57	7	31	2
2011	116	5	22	0

Figure 2: PM_{2.5} trends at BC Access Centre



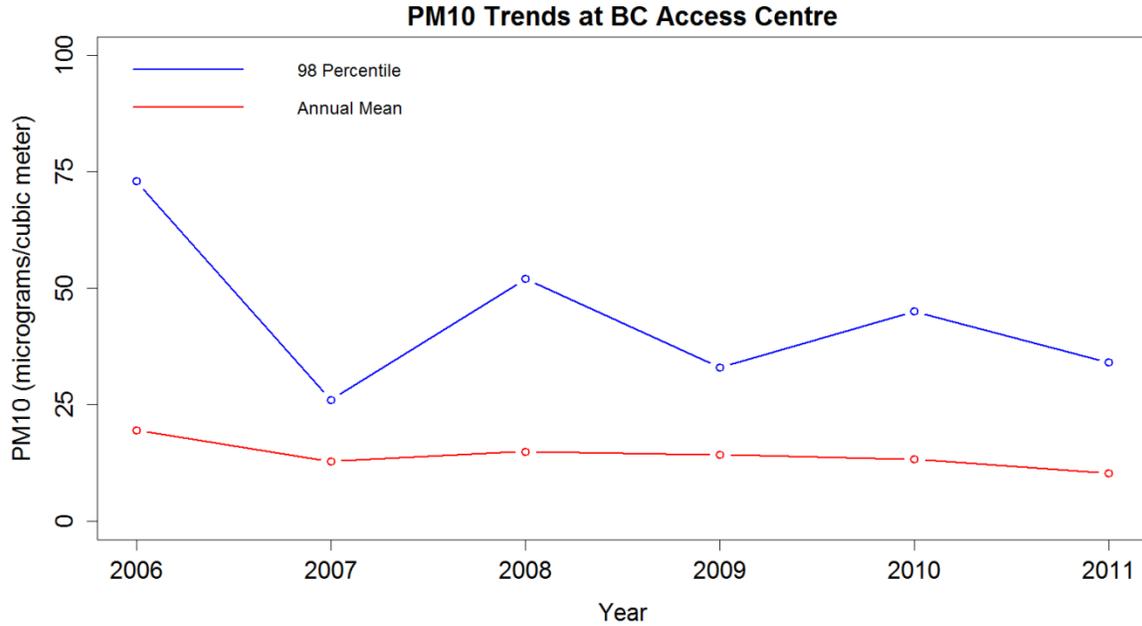
3.2 PM₁₀

The provincial objective for PM₁₀ is 50 µg/m³ (24-hour average). A summary of yearly PM₁₀ data is provided in Table 3, including sample size, mean, 98th percentile and the number of observed exceedances (24-hour average >50 µg/m³). Since there is no continuous monitoring station in 100 Mile House, the exact number of exceedances in a given year cannot be determined. The number of measured exceedances has decreased in the last four years (Table 3). Additional sampling (between scheduled NAPS days) in 2011 did not show an increase in the number measured exceedances. It can be seen that the mean levels of PM₁₀ have been largely stable over the last four years (Figure 3). The 98th percentile, which is indicative of how high the high values were, has shown some decline since 2006.

Table 3: Summary of PM₁₀ means, 98th percentile and exceedances

Year	Sample size	Mean (µg/m³)	98th percentile (µg/m³)	Number of Measured Exceedances
2006	64	19	73	5
2007	60	13	26	0
2008	58	15	52	2
2009	57	14	33	1
2010	59	13	45	1
2011	117	10	34	0

Figure 3: PM₁₀ trends at BC Access Centre



3.3 Conclusions

Both provincial objectives for PM_{2.5} were met in 2011 at the BC Access Centre in 100 Mile House. The number of measured PM₁₀ exceedances is low, even with increased sampling frequency in 2011. In the absence of continuous monitoring, the exact number of exceedances of the 24-hour PM₁₀ objective cannot be determined.