

# **Atholville Air Quality Report**

***2011 Mobile Air Quality Monitoring Program***

Department of Environment and  
Local Government  
June 2012



## 1.0 Executive Summary

The AV Cell Pulp Mill operates two air quality monitoring stations in Atholville, New Brunswick. These stations are located approximately east and west of the facility (further information with respect to equipment location provided in section 2.2).

Air quality modeling for the Atholville area suggests that the two industry-operated air quality monitoring sites are appropriately located. However, in an effort to verify the suitability of these existing, industry-operated, air quality monitoring stations, the Department of Environment and Local Government (DELG) deployed its mobile air quality monitoring station to an area closer to the pulp mill in August 2011 for a three-month study of local air quality and wind patterns.

The wind patterns identified during the study suggest that the existing monitoring sites for the AV Cell Pulp Mill are appropriately placed, with prevailing winds tending to carry air contaminant emissions toward the Boom Road and Beauvista monitoring sites.

Air quality in the Atholville area was found to be good for all parameters monitored, as described below in Table 1.

**Table 1: Atholville Air Quality Summary**

Pollutant	Average Value (hourly)	Peak Value	Standard
Sulphur Dioxide (SO <sub>2</sub> )	2 ppb	97 ppb	339 ppb
Nitrogen Dioxide (NO <sub>2</sub> )	2.5 ppb	21 ppb	210 ppb
Ground Level Ozone (O <sub>3</sub> )	17.7 ppb	57 ppb	82 ppb*
Total Reduced Sulphur (TRS)	0.05 ppb	17 ppb**	11 ppb***
Fine Particulate Matter (PM <sub>2.5</sub> )	6 µg/m <sup>3</sup> (24-hour)	17 µg/m <sup>3</sup>	30 µg/m <sup>3</sup> ****

\* Nationally recognized but non-binding standard

\*\* Peak value was brief and attributable to an unusual event

\*\*\* Standard is not for TRS but a related contaminant - Hydrogen Sulphide

\*\*\*\* Nationally recognized but non-binding standard for 3-year averaged peak values.

No exceedances of health-related air quality objectives for any of the pollutants measured were recorded during the monitoring program. However, one incident of elevated total Reduced Sulphur (TRS) was detected on August 19, 2011. TRS compounds are not normally considered a health hazard. They are, however, a primary cause of odours. Typical industrial sources of TRS include the steel industry, pulp and paper mills, refineries and sewage treatment facilities. Natural sources include swamps, bogs and marshes.

Investigations carried out by the Bathurst regional office immediately following the TRS event revealed the source to be a stockpile of clarifier sludge at the mill that was waiting to be trucked away as feedstock for a composting facility. The sludge sat in the yard too long and began to generate gases that contribute to TRS values. The AV Cell Pulp Mill has committed to ensuring that sludge is transported offsite in a more timely manner. Provided that they are diligent in this regard, similar TRS events would not be expected to occur again.

The Department of Environment and Local Government, through the Air Quality Approval process, will continue to be vigilant regarding the situation in Atholville. Should specific concerns arise with respect to this facility the Department will take appropriate measures to address them.

## 2.0 Methodology

### 2.1 Monitoring Equipment

The Department's mobile air quality monitoring station was used for the study. It was outfitted with air quality monitoring equipment to measure ambient concentrations of: sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ground level ozone (O<sub>3</sub>), total reduced sulphur (TRS), and fine particulate matter (PM<sub>2.5</sub>). The station was also equipped with a meteorological tower for measuring wind speed and wind direction.

The above-noted air pollutants were measured on a continuous basis and compared to associated New Brunswick air quality objectives, National Ambient Air Quality Objectives (NAAQO), and Canada-wide Standards (CWS). Technical specifications for the instrumentation used are provided in Table 2.

**Table 2: Operating Specifications for Air Quality Monitoring Equipment**

Pollutant	Measurement Method	Monitor Type	Minimum Detection Limit
Ozone (O <sub>3</sub> )	UV Absorption	Continuous Automated	2 ppb
Carbon Monoxide (CO)	Infrared Gas Filter Correlation	Continuous Automated	0.1 ppm
Sulphur Dioxide (SO <sub>2</sub> )	UV Fluorescence	Continuous Automated	2 ppb
Total Reduced Sulphur (TRS)	UV Fluorescence	Continuous Automated	1 ppb
Nitrogen Dioxide (NO <sub>2</sub> )	Chemiluminescence	Continuous Automated	2 ppb
Fine Particulate Matter (PM <sub>2.5</sub> )	Beta radiation attenuation	Continuous Automated	1.0 µg/m <sup>3</sup>

## 2.2 Location

A suitable location for the study, with ready access to electrical power, was found at 235 Notre Dame Street, Atholville. The study area is pictured in Figure 1.



Figure 1. Study Location

## 2.3 Operation and Data Management

Continuous monitoring began on August 12, 2011 and ended on November 28, 2011. Data was retrieved automatically on an hourly basis for all parameters measured.

Monitoring was disrupted between September 29, 2011 and October 12, 2011 due to equipment malfunction. Monitoring of CO did not continue when monitoring resumed. Also, CO monitoring data prior to the malfunction was found to be suspect, and has been omitted from this report.

The fine particulate monitor suffered two additional malfunctions resulting in no data being collected from August 21, 2011 to August 22, 2011, and from August 27, 2011 to September 6, 2011.

### 3.0 Results

#### 3.1 Wind Speed and Direction

Wind speed and direction are illustrated in Figure 2. As indicated in the wind rose diagram, winds at the study location originate primarily out of the southwest and west.

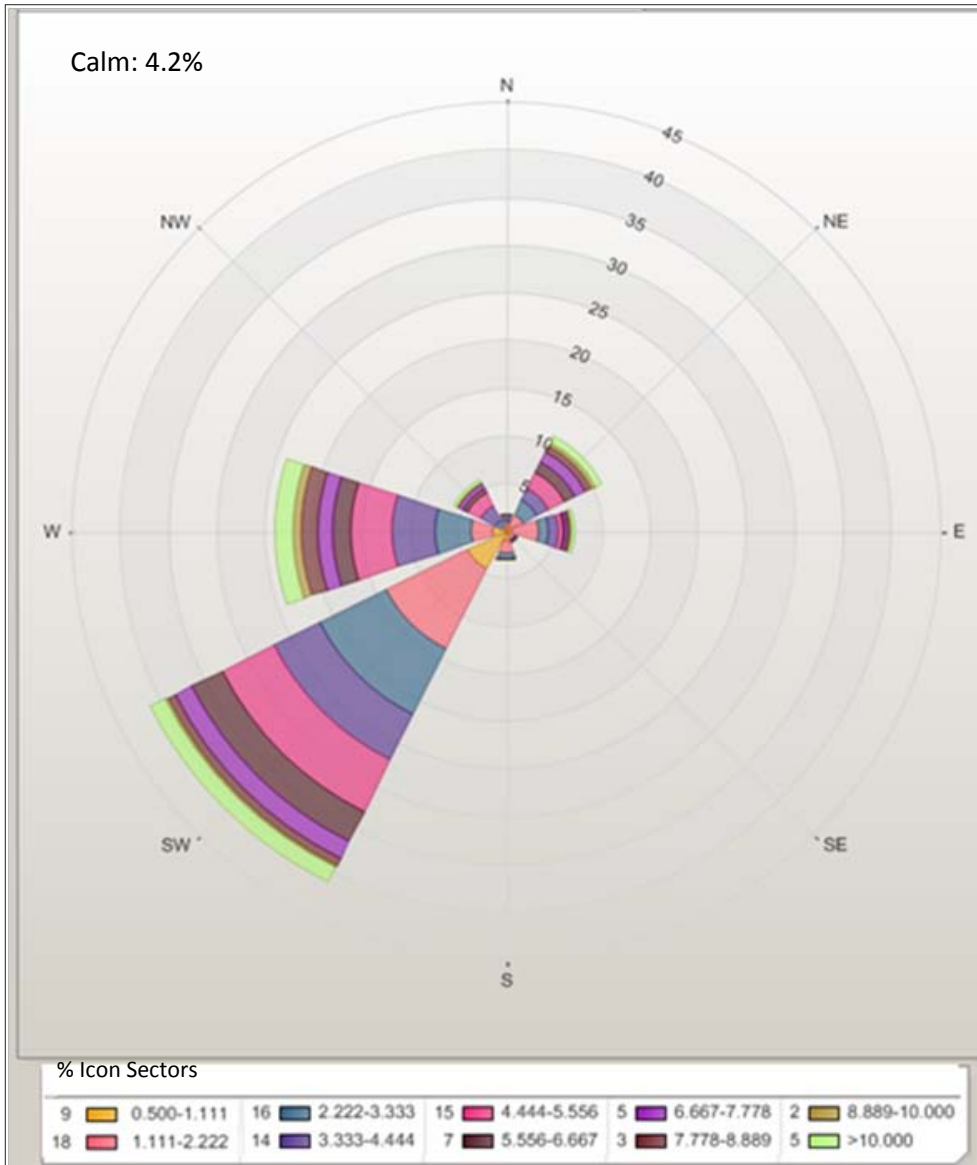


Figure 2. Wind Rose - Atholville

### 3.2 Sulphur Dioxide (SO<sub>2</sub>)

Sulphur dioxide levels during the study period are indicated in Figure 3. The highest value recorded was 97 parts per billion (ppb), which occurred on August 19, 2011. This peak level is well below the regulated ambient limit of 339 ppb. The overall average 1-hour concentration of SO<sub>2</sub> during the study period was 2 ppb.

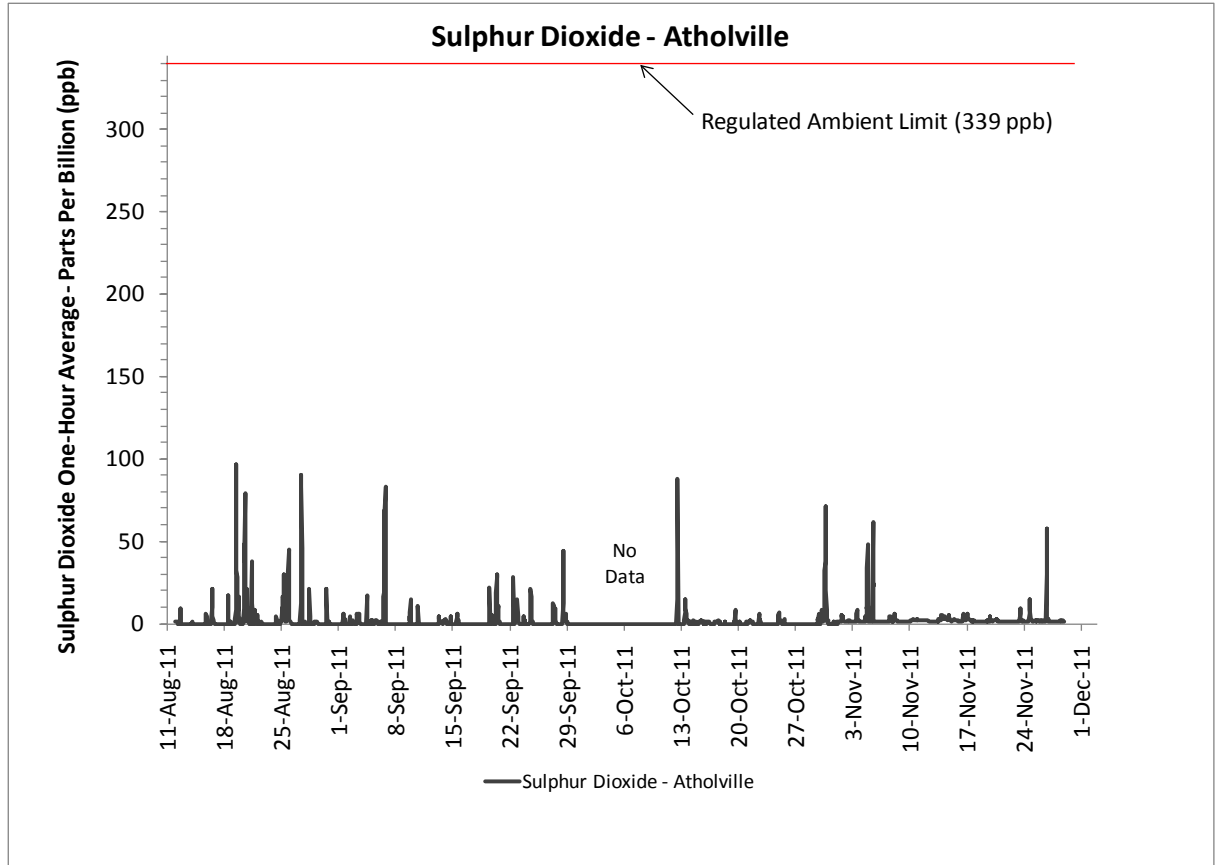


Figure 3. Sulphur Dioxide Concentration (One-Hour Average)



### 3.3 Nitrogen Dioxide (NO<sub>2</sub>)

Nitrogen dioxide levels during the study period are indicated in Figure 4. The highest value recorded was 21 ppb, which occurred on November 24, 2011. The regulated ambient limit for nitrogen dioxide (one-hour average) is 210 ppb.

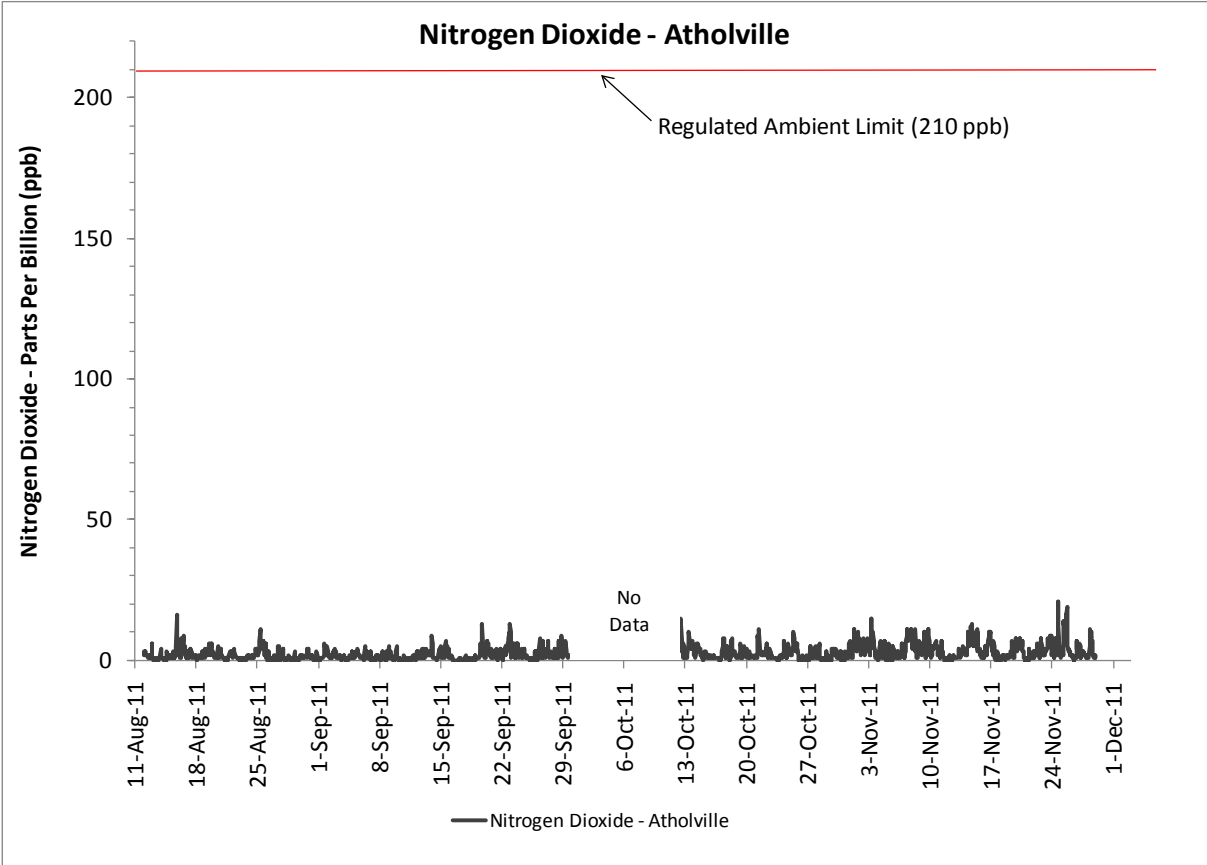


Figure 4. Nitrogen Dioxide Concentration (One-Hour Average)



### 3.4 Ground Level Ozone (O<sub>3</sub>)

Ozone concentrations during the study period are indicated in Figure 5. The highest value recorded was 71 ppb, which occurred on July 29, 2010. There are no regulated ambient limits for O<sub>3</sub>. However, New Brunswick recognizes the NAAQO levels (non-binding federal standards under the Canadian Environmental Protection Act) for O<sub>3</sub>. Ozone levels remained below the NAAQO level of 82 ppb for the entire study.

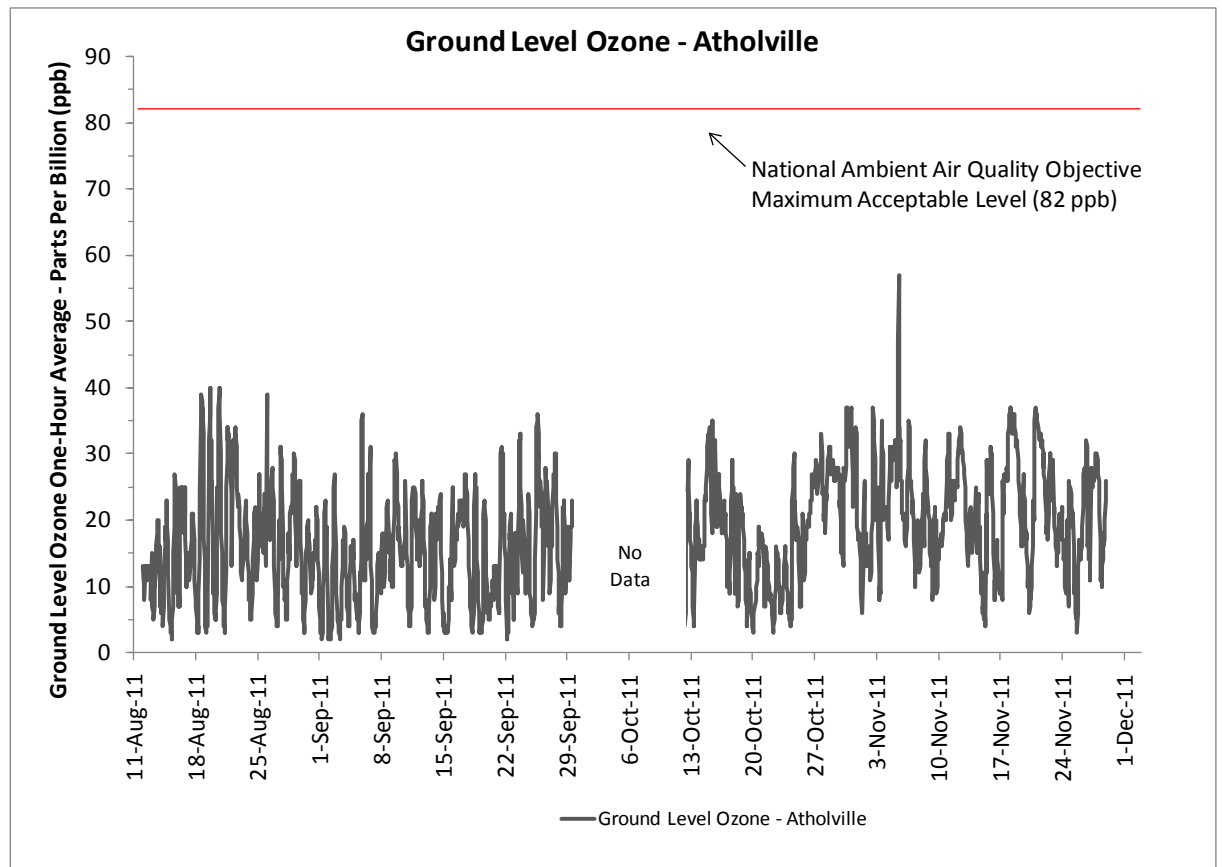


Figure 5. Ground Level Ozone Concentration (One-Hour Average)

### 3.5 Total Reduced Sulphur (TRS)

Total reduced sulphur levels during the study period are indicated in Figure 6. The highest value recorded was 17 ppb, which occurred on August 19, 2011. There is no regulated ambient limit or recognized standard for TRS in New Brunswick. However, it is worthwhile to compare TRS values against the regulated ambient limit for hydrogen sulphide, which is 11 ppb (one-hour average). DELG uses TRS as an approximate proxy for hydrogen sulphide because continuous monitoring of hydrogen sulphide alone is not feasible. Hydrogen sulphide is a key component of a mix of gases that contribute to the TRS value.

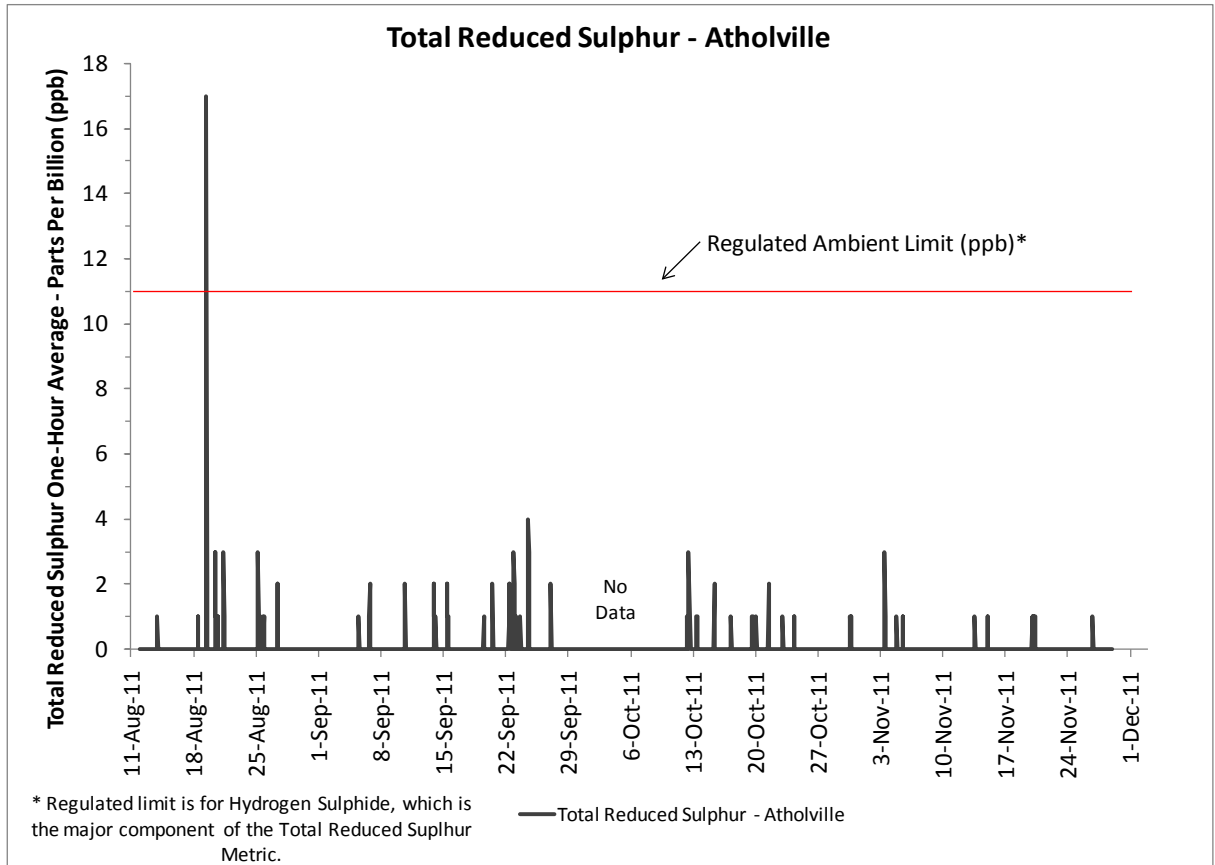


Figure 6. Total Reduced Sulphur Concentration (One-Hour Average)

### 3.6 Fine Particulate Matter (<2.5 micron particle size)

Fine particulate matter (PM<sub>2.5</sub>) levels (24-hour average) during the study period are indicated in Figure 7. The highest value recorded was 17 micrograms per cubic meter (µg/m<sup>3</sup>), which occurred on November 14, 2011. There are no regulated ambient limits for PM<sub>2.5</sub>. However, New Brunswick recognizes the CWS (a non-binding, non-legislated standard) for PM<sub>2.5</sub>. Levels remained below the CWS reference point of 30 µg/m<sup>3</sup> (24-hour average) for the entire study.

It should be noted that although the CWS standard is illustrative as a reference point, it is not directly comparable to the data generated during the study. Compliance with the CWS value is determined based on a three-year rolling average of the highest (98th percentile) 24-hour readings for a site. Thus, for all 24-hour average readings to remain below this value for a period of three months suggests extremely low PM<sub>2.5</sub> levels relative to the standard.

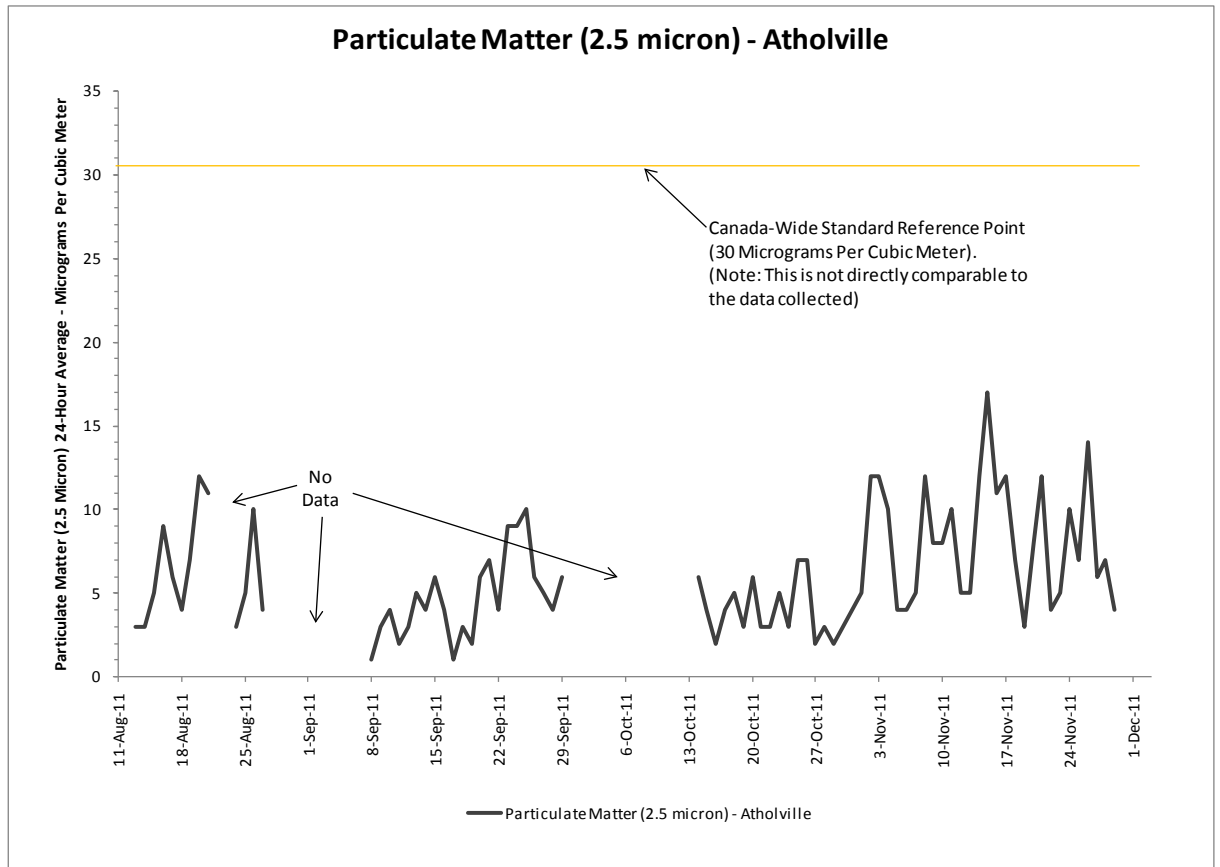


Figure 7. Fine Particulate Matter (24-Hour Average)

#### **4.0 Discussion and Conclusions**

The wind patterns identified during the study suggest that the existing monitoring sites for the AV Cell Pulp Mill are appropriately placed, with prevailing winds tending to carrying air contaminant emissions toward the Boom Road and Beauvista SO<sub>2</sub> monitoring sites. Also, SO<sub>2</sub> levels measured at the study location were generally lower than those typically recorded at the Boom Road and Beauvista stations. The study location experienced an overall mean SO<sub>2</sub> concentration (1-hour average) of 2 ppb, whereas the two existing monitoring stations typically experience overall mean concentrations (1-hour average) of 4 to 5 ppb, based on historical data.

It should also be noted that although the TRS levels detected during the study may have an aesthetic impact on air quality, the peak levels measured (17 ppb) are far below the concentrations at which health impacts would begin to be a concern (approximately 1,000 ppb).

## Glossary

SO <sub>2</sub>	Sulphur dioxide
O <sub>3</sub>	Ozone
NO <sub>2</sub>	Nitrogen dioxide
TRS	Total reduced sulphur
CO	Carbon monoxide
PM <sub>2.5</sub>	Fine particulate, suspended particles up to 2.5 microns in diameter
BAM	Beta attenuation method
DELG	New Brunswick Department of Environment and Local Government
ppm	parts per million
ppb	parts per billion
µg/m <sup>3</sup>	micrograms per cubic meter
NAAQO	National Ambient Air Quality Objectives
CWS	Canada-wide Standards

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**Date: June 5, 2012**