

2006 SECOND QUARTER REPORT

**EPCOR/TRANSALTA UTILITIES
WABAMUN-GENESEE AREA AIR MONITORING
PROGRAMS**

SEACOR PROJECT NO: 213.06405.09/10/11/12

2006 SECOND QUARTER REPORT

**TRANSALTA UTILITIES AND EPCOR
WABAMUN-GENESEE AREA AIR MONITORING PROGRAMS**

- ◆ **AMBIENT AIR QUALITY MONITORING PROGRAM** ◆
- ◆ **ACID DEPOSITION ASSESSMENT PROGRAM** ◆
- ◆ **MERCURY ASSESSMENT PROGRAM** ◆

SEACOR PROJECTS: 213.06405.09/10/11/12

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EXECUTIVE SUMMARY

TransAlta Utilities and EPCOR Generation Inc. operate four coal-fired thermal power plants – Sundance, Keephills, Wabamun, and Genesee - located in the Wabamun-Genesee area of west-central Alberta. The power plants operate under Alberta Environmental Protection and Enhancement Act approvals listed in Table 1. Under their approvals, the power plants are committed to conducting special environmental monitoring programs. Three environmental monitoring programs conducted on an on-going manner include:

- Regional ambient air monitoring program.
- Acid deposition assessment program.
- Mercury assessment program.

This quarterly report summarizes key results of data collected for these programs in the second quarter (April, May, and June) of 2006. Contraventions of approval terms and applicable air quality monitoring objectives, completeness of monitoring data, and quarterly summary statistics for selected air quality parameters are summarized and discussed.

Regional Ambient Air Program

There were no notable issues with the regional ambient air program. All continuous data were above 90%. All measured concentrations were also well below applicable ambient air guidelines and standards.

Two intermittent particulate matter (Partisol) samplers at the Genesee station failed due to power outages in the second quarter. A rain shelter has been installed over the power box of one of the Partisols to prevent future recurrence. Data capture rates for the passive program in the second quarter were 100% for NO₂, SO₂, and O₃.

Acid Deposition Program

TSP samples at the Violet Grove station were missed on three sampling events in the second quarter of 2006. During this period, the particulate matter (Partisol) sampler was out for servicing to replace its mass flow controller. Flows for the sampler had previously displayed incorrect flow times. This problem was repaired once the mass flow controller was replaced and tuned.

Mercury Assessment Program

There were no notable issues with the mercury assessment program in the first quarter of 2006 (the most recent period for which results were available). Conversion of this site to the National Acid Deposition Program's Mercury Deposition Program (MDN) continued in the second quarter of 2006.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
TABLE OF CONTENTS.....	iii
1 INTRODUCTION	1
1.1 Environmental Monitoring Programs for Power Plants	1
1.1.1 Ambient Air Quality Monitoring Program	1
1.1.2 Acid Deposition Assessment Program	3
1.1.3 Mercury Assessment Program	4
1.2 Purpose of Report.....	4
2 RESULTS AND DISCUSSION.....	5
2.1 Contraventions of Special Environmental Monitoring Programs	5
2.2 Regional Ambient Air Quality Monitoring Program	5
2.2.1 Data Completeness	5
2.2.2 Summary Statistics	6
2.3 Acid Deposition Assessment Program	12
2.3.1 Data Completeness	12
2.4 Mercury Assessment Program	13
2.4.1 Data Completeness	13
3 CONCLUSIONS.....	14

1 INTRODUCTION

TransAlta Utilities (TransAlta) [www.transalta.com] and EPCOR Generation Inc. (EPCOR) [www.epcor.ca] operate four coal-fired thermal power plants – Sundance, Keephills, Wabamun, and Genesee - located in the Wabamun-Genesee area of west-central Alberta. The location of these power plants is shown in Figure 1. Collectively, the four power plants have the capacity to generate a total of 4,277 MW to Alberta's electrical grid.

1.1 Environmental Monitoring Programs for Power Plants

The power plants operate under Alberta Environmental Protection and Enhancement Act (EPEA) approvals listed in Table 1. Under their EPEA approvals, the power plants are committed to conducting special environmental monitoring programs. These programs are designed to:

- Identify and quantify ambient levels and deposition patterns of chemical species of potential concern that are associated with power plant emissions.
- Generate an inventory of representative baseline data for the chemicals of potential concern.
- Provide data for assessing long-term impacts and for evaluating and implementing air quality management plans.

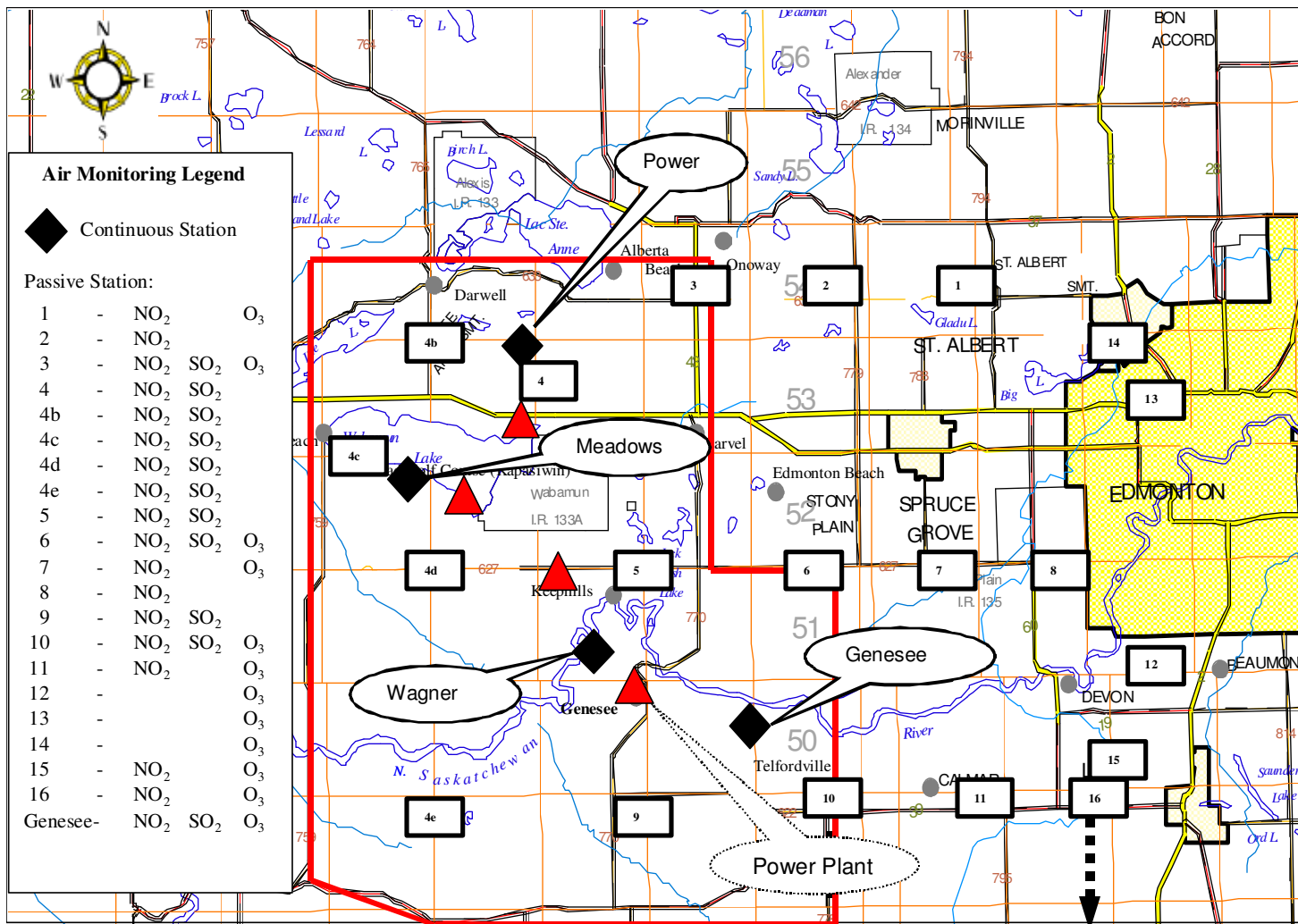
Table 1 Alberta Environmental Protection and Enhancement Act (EPEA) operating approvals for four power plants in the Wabamun-Genesee area.

Operator/Facility Name	Capacity (MW, net)	Location	Approval No. (with amendments)
EPCOR/Genesee Power Plant	1,212	25-50-03 W5M	773-02-00
TAU/Keephills Power Plant	766	36-51-04 W5M	10324-01-00
TAU/Wabamun Power Plant	279	2,3,10,11-53-04 W5M	10323-02-00
TAU/Sundance Power Plant	2,020	3,4,8,9,10,16,17,20, and 31-52-04 W5M	9830-01-00

1.1.1 Ambient Air Quality Monitoring Program

A component of the special environmental monitoring programs is an ambient air quality monitoring program. The ambient air quality monitoring program consists of the following elements:

Figure 1 EPCOR/TransAlta power plant and air monitoring locations in the Wabamun-Genesee area.



- A continuous monitoring program consisting of four air monitoring stations (Figure 1) – Power, Meadows, Wagner, and Genesee. Sulphur dioxide (SO₂), nitrogen dioxide (NO₂), and a number of meteorological parameters are measured at all four stations, particulate matter with aerodynamic diameter less than or equal to 2.5 microns (PM_{2.5}) is measured at Power and Genesee, and ozone (O₃) is measured at Genesee.
- An integrated monitoring program (integrated monitoring for 24 hours every 6 days) for particulate matter with aerodynamic diameter less than or equal to 10 microns (PM₁₀), and PM_{2.5}, and metals speciation of PM_{2.5} at two locations – Power and Genesee.
- A passive monitoring program with monthly passive monitoring at 21 stations in the Wabamun-Genesee area measuring NO₂, SO₂, and O₃ at selected stations. Nineteen stations are shown in Figure 1. Two additional stations (15 and 16) were added in February 2006. These stations are located outside of the area shown in Figure 1 in the lower right hand corner and monitor NO₂ and O₃.

A schedule for the sampling programs described above is presented in Table 2.

Table 2 Schedule for elements of the ambient air quality monitoring program in the Wabamun-Genesee area.

Parameter	Continuous	Intermittent –every 6 th day (NAPS schedule)	Monthly (passives)
SO ₂	•		•
NO ₂	•		•
O ₃	•		•
Total suspended particulate		•	
PM ₁₀		•	
PM _{2.5}	•	•	
Wind speed and direction, temperature, relative humidity	•		

1.1.2 Acid Deposition Assessment Program

Another component of the special environmental monitoring programs is an acid deposition assessment program. The acid deposition assessment program includes wet and dry deposition monitoring of sulphur and nitrogen species that are important contributors to acid deposition in the Wabamun-Genesee area.

Two dedicated acid deposition monitoring sites are operated in the Wabamun-Genesee area. These sites are the Genesee air monitoring station (Figure 1) and the Violet Grove air monitoring station. The four coal-fired power plants are located at distances of 8 to 33 km away from the Genesee station. The Violet Grove station is not shown in Figure 1 as it is located outside of the area shown in this figure in the lower left-hand corner. The four power plants are located at distances of 55 to 60 km away from the Violet Grove station. The following parameters are currently measured at these two stations:

Wet Deposition Components

- Chemistry from precipitation samples collected monthly
 - pH, Na⁺, K⁺, Mg²⁺, Ca²⁺, NH₄⁺, NO₃⁻, Cl⁻, SO₄²⁻, PO₄³⁻
- Precipitation amounts recorded hourly

Dry Deposition Components

1. Acidic parameters:

- Atmospheric gases
 - continuous SO₂ and NO₂
 - monthly integrated annular denuder samples for gaseous HNO₃ and HNO₂ (and NH₃, although it is not used in computing deposition of total nitrogen species)
- Particulate matter (TSP) – one 24-hour integrated sample collected every 6th day –
 - Na⁺, K⁺, Mg²⁺, Ca²⁺, NH₄⁺, SO₄²⁻, and NO₃⁻

2. Meteorological parameters (continuous):

- Wind speed
- Wind direction standard deviation
- Relative humidity
- Surface wetness
- Air temperature at 10-m height
- Air temperature at 2-m height

1.1.3 Mercury Assessment Program

The mercury assessment program consists of wet and dry deposition monitoring. The objective of this program component is to quantify wet and dry deposition rates of mercury in the Wabamun-Genesee region to better understand potential effects of power plant emissions on receptors in the area. Wet deposition monitoring is conducted at the Genesee air monitoring station (Figure 1). Wet deposition samples are collected on a weekly basis from this station. A full dry deposition monitoring component was designed during the second quarter of 2006, and is currently being implemented with the approval of Alberta Environment.

1.2 Purpose of Report

This quarterly report summarizes key results of data collected in the second quarter (April, May, and June) of the calendar year 2006. Specifically, contraventions of approval terms and applicable air quality monitoring objectives, completeness of monitoring data, and quarterly summary statistics for selected air quality parameters are summarized and discussed.

2 RESULTS AND DISCUSSION

2.1 Contraventions of Special Environmental Monitoring Programs

No contraventions of approval terms and applicable air quality monitoring objectives were reported for the April to June 2006 period.

2.2 Regional Ambient Air Quality Monitoring Program

2.2.1 Data Completeness

There were two instances of invalid or missing data for intermittent PM₁₀ and PM_{2.5} samples. These are identified and explained in Table 3. Data capture rates for PM₁₀ and PM_{2.5} intermittent samples are listed in Table 4.

Table 3 Instances of invalid sample collection of intermittent PM₁₀ and PM_{2.5} monitoring during Q2 2006.

Date	Station	Parameter	Cause	Corrective Action
April 17	Genesee	PM _{2.5}	Unit did not sample, power outage	Reset machine
June 28	Genesee	PM ₁₀	Unit did not sample, power outage	Reset machine, rain shelter installed over power box

Table 4 Data capture rates for intermittent PM₁₀ and PM_{2.5} monitoring during Q2 2006.

	Power				Genesee			
	4	5	6	Q2	4	5	6	Q2
Month:	4	5	6	Q2	4	5	6	Q2
PM ₁₀ :	5/5	5/5	5/5	15/15	5/5	5/5	4/5	14/15
PM _{2.5} :	5/5	5/5	5/5	15/15	4/5	5/5	5/5	14/15

Note: Data capture rates expressed as number of valid samples /total number of samples.

Data capture rates for the passive samples are presented in Table 5. There were no instances of invalid or missing data for the second quarter of 2006.

Q2 2006 uptimes for continuous monitoring equipment and stations are summarized in Table 6. There were no incidents of monthly uptime lower than 90%.

Table 5 Data capture rates for passive monitoring parameters during Q2 2006.

Parameter	Capture Rate
NO ₂	54/54
SO ₂	33/33
O ₃	36/36

Note: Data capture rates expressed as number of valid samples /total number of samples.

2.2.2 Summary Statistics

One method of displaying a set of air quality data is with box-and-whisker plots. Box-and-whisker plots are helpful in interpreting the distribution of data. These plots only illustrate certain statistics rather than all the data. The plots presented here show five values for individual pollutants collected at each station during Q2 2006:

- 25th percentile (bottom of box)
- 50th percentile (horizontal line within box)
- 75th percentile (top of box)
- 98th percentile (diamond)
- maximum (top T)

Box-and-whisker plots are presented for Q2 2006 for the following parameters:

- 1-hour average NO₂ concentrations from continuous monitoring (Figure 2)
- 24-hour average NO₂ concentrations from continuous monitoring (Figure 3)
- 1-hour average SO₂ concentrations from continuous monitoring (Figure 4)
- 24-hour average SO₂ concentrations from continuous monitoring (Figure 5)
- 1-hour average O₃ concentrations from continuous monitoring (Figure 6)
- 8-hour average O₃ concentrations from continuous monitoring (Figure 7)
- 24-hour average PM_{2.5} concentrations from continuous monitoring (Figure 8)
- 24-hour average PM₁₀ concentrations from intermittent monitoring (Figure 9)
- 24-hour average PM_{2.5} concentrations from intermittent monitoring (Figure 10)

All measured concentrations were well below applicable AAAQOs shown in these figures.

Table 6 Data capture rates (%) for continuous monitoring parameters during Q2 2006.

Month:	Meadows				Wagner				Power				Genesee			
	4	5	6	Q2	4	5	6	Q2	4	5	6	Q2	4	5	6	Q2
NO ₂	97.6	98.0	100.0	98.5	99.3	100.0	100.0	99.8	99.9	100.0	100.0	100.0	100.0	100.0	94.4	98.1
SO ₂	99.9	98.0	100.0	99.3	99.3	100.0	100.0	99.8	99.9	100.0	100.0	100.0	100.0	100.0	94.4	98.1
O ₃	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100.0	100.0	94.3	98.1
PM _{2.5}	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	98.6	98.9	98.5	98.7	99.0	99.6	93.8	97.5
WSP	99.9	98.0	100.0	99.3	99.3	100.0	100.0	99.8	99.9	100.0	100.0	100.0	100.0	100.0	93.5	97.8
WDR	99.9	98.0	100.0	99.3	99.3	100.0	100.0	99.8	99.9	100.0	100.0	100.0	100.0	100.0	93.5	97.8
T ₂	99.9	98.0	100.0	99.3	99.3	100.0	100.0	99.8	99.9	100.0	100.0	100.0	100.0	100.0	94.4	98.1
T ₁₀	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100.0	100.0	94.4	98.1
RH	99.9	98.0	100.0	99.3	99.3	100.0	100.0	99.8	99.9	100.0	100.0	100.0	100.0	100.0	94.4	98.1

Key: WSP = wind speed
WDR = wind direction
T₁₀ = temperature at 10 metres height above ground
T₂ = temperature at 2 metre height above ground
RH = relative humidity
n/a = not applicable
Bolded values indicate <90% uptime

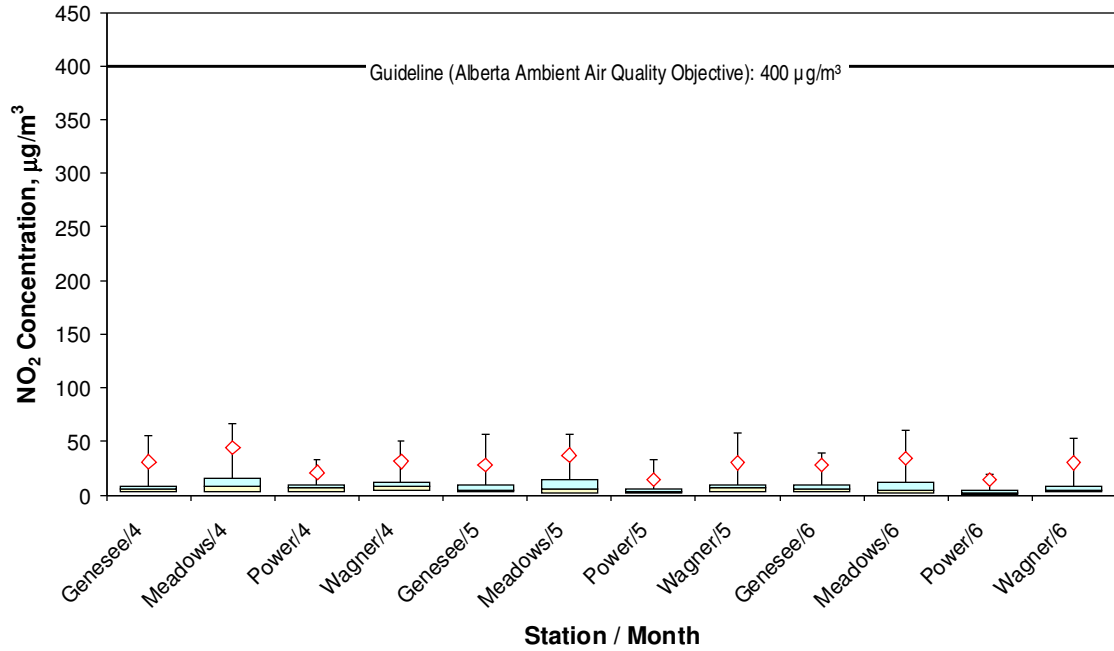


Figure 2 Box-and-Whisker plot of 1-hour average NO₂ concentrations from continuous monitoring at selected stations in central Alberta during Q2 2006.

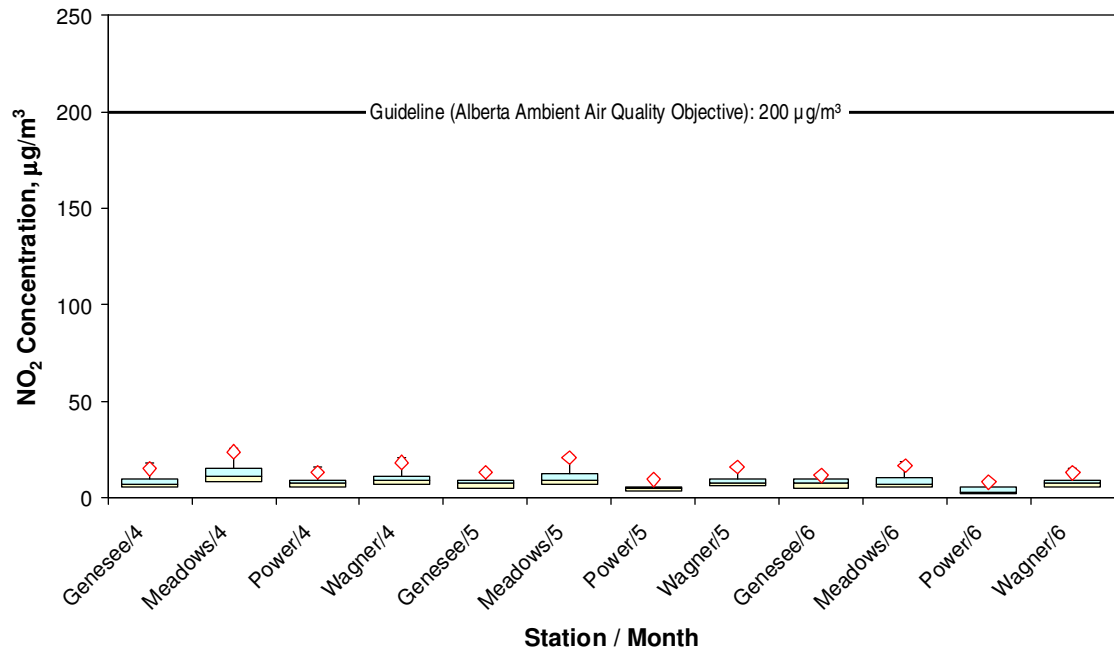


Figure 3 Box-and-Whisker plot of 24-hour average NO₂ concentrations from continuous monitoring at selected stations in central Alberta during Q2 2006.

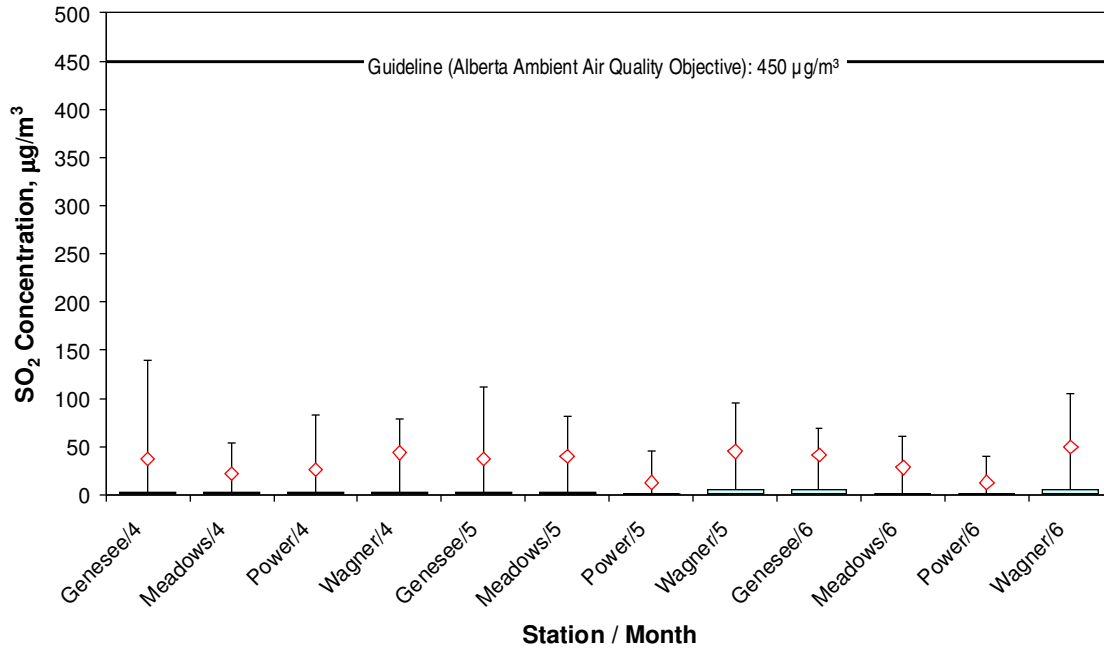


Figure 4 Box-and-Whisker plot of 1-hour average SO₂ concentrations from continuous monitoring at selected stations in central Alberta during Q2 2006.

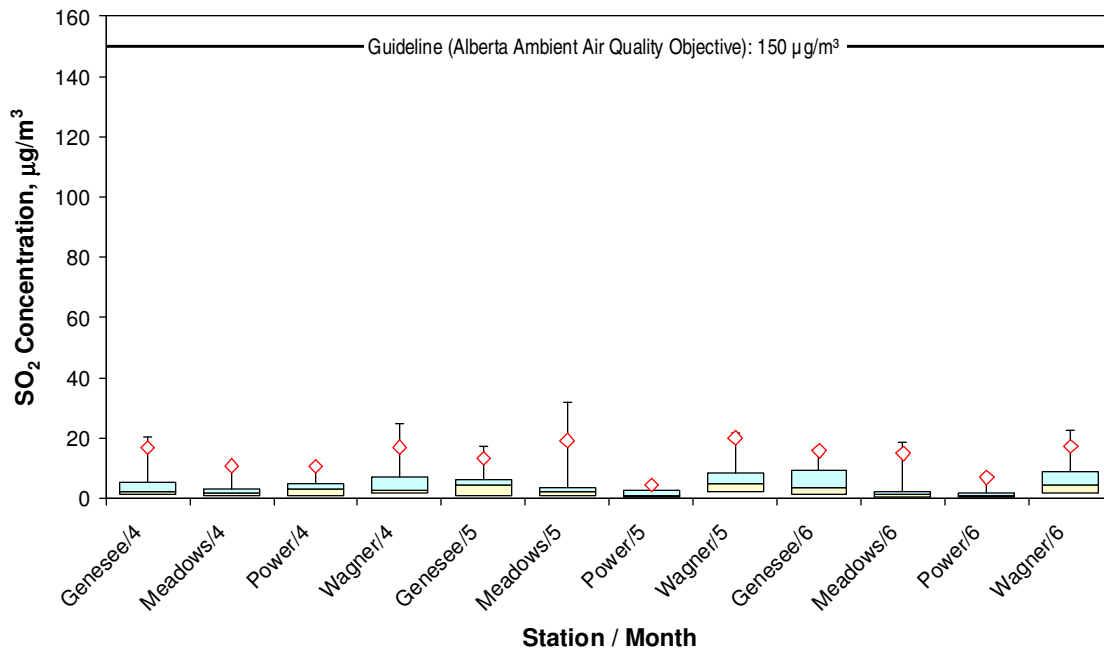


Figure 5 Box-and-Whisker plot of 24-hour average SO₂ concentrations from continuous monitoring at selected stations in central Alberta during Q2 2006.

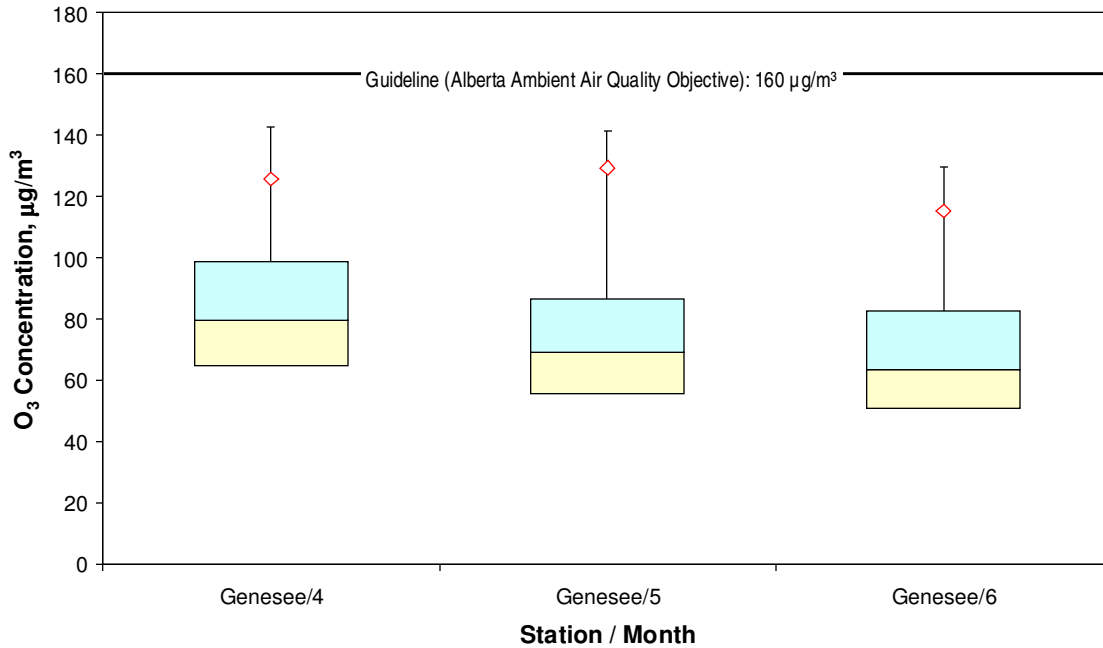


Figure 6 Box-and-Whisker plot of 1-hour average O₃ concentrations from continuous monitoring at Genesee station in central Alberta during Q2 2006.

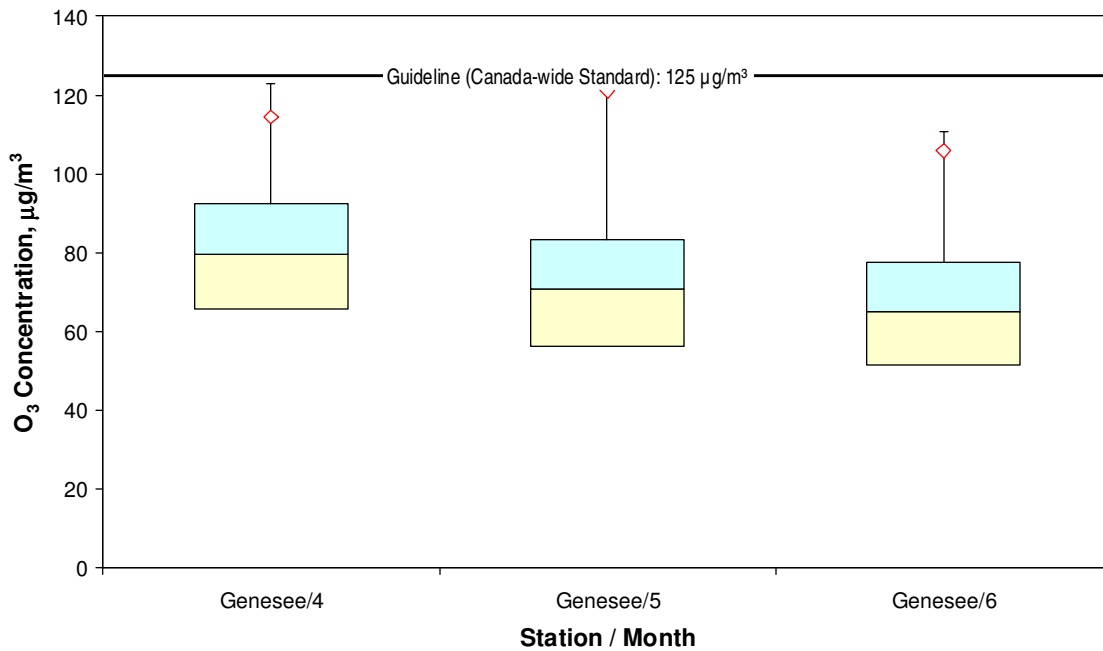


Figure 7 Box-and-Whisker plot of 8-hour average O₃ concentrations from continuous monitoring at Genesee station in central Alberta during Q2 2006.

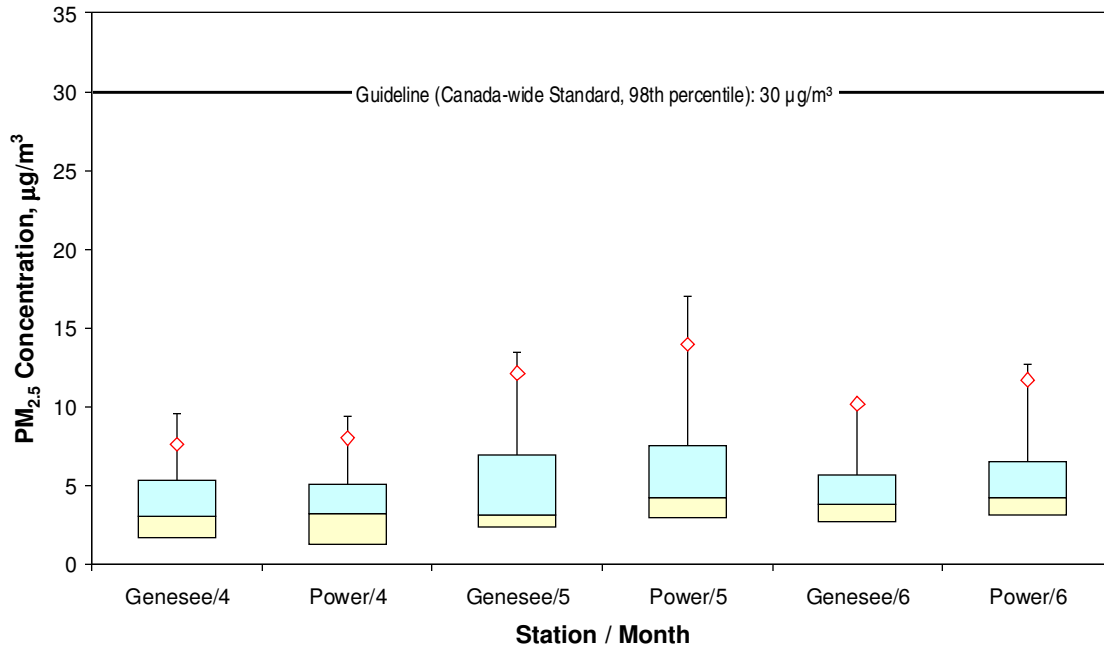


Figure 8 Box-and-Whisker plot of 24-hour average PM_{2.5} concentrations from continuous monitoring at Genesee and Power stations in central Alberta during Q2 2006.

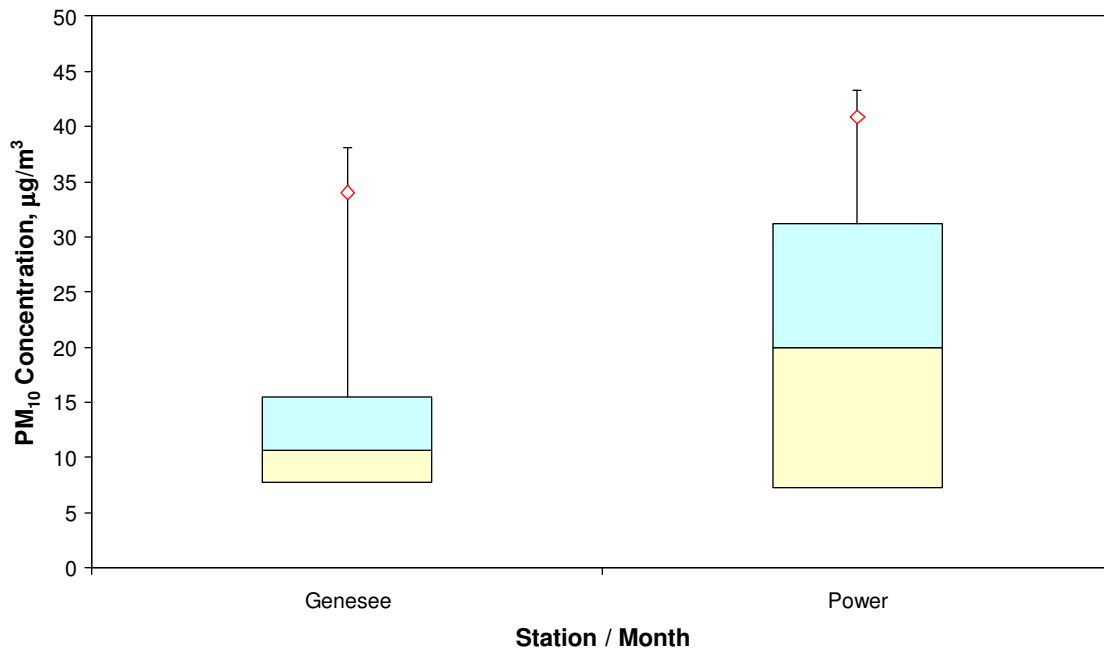


Figure 9 Box-and-Whisker plot of 24-hour average PM₁₀ concentrations from intermittent monitoring at Genesee and Power stations in central Alberta during Q2 2006.

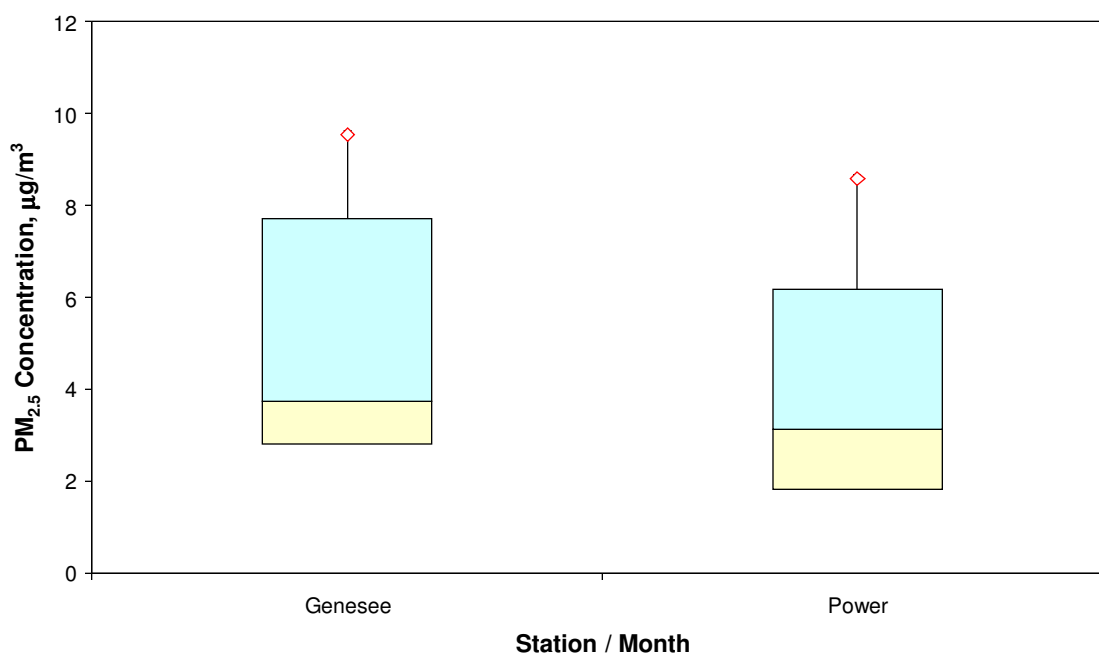


Figure 10 Box-and-Whisker plot of 24-hour average PM_{2.5} concentrations from intermittent monitoring at Genesee and Power stations in central Alberta during Q2 2006.

2.3 Acid Deposition Assessment Program

2.3.1 Data Completeness

There were four incidents of invalid or missing data in the second quarter of 2006 for the acid deposition program integrated samples. These incidents are summarized in Table 7. The corresponding data capture are presented in Table 8. The June 4 TSP filter surface appeared to be puckered, but did not exhibit unusual results when analyzed.

Table 7. Incidences of Invalid Data

Date	Station	Parameter	Cause	Corrective Action
April 5	Genesee	TSP	Power outage	Installed rain shelter over power box
April 5	Violet Grove	TSP	Partisol unit out for repairs	Mass flow controller replaced & unit placed back in service
April 11	Violet Grove	TSP	Partisol unit out for repairs	Mass flow controller replaced & unit placed back in service
April 17	Violet Grove	TSP	Partisol unit out for repairs	Mass flow controller replaced & unit placed back in service

Table 9 shows data capture rates for continuous data collected at the Genesee and Violet Grove stations for the acid deposition assessment program. All data capture rates were above 90% for the continuous monitoring program in the second quarter of 2006.

Table 8. Data Capture Rates for Integrated Data

Station	Violet Grove				Genesee			
	4	5	6	Q2	4	5	6	Q2
TSP	2/5	5/5	5/5	12/15	4/5	5/5	5/5	14/15
HNO ₃	1/1	1/1	1/1	3/3	1/1	1/1	1/1	3/3
HNO ₂	1/1	1/1	1/1	3/3	1/1	1/1	1/1	3/3
NH ₃	1/1	1/1	1/1	3/3	1/1	1/1	1/1	3/3

Note: Data capture rates were expressed as: valid data number/total sample number.

Table 9. Data Capture Rates (%) for Continuous Data

Station	Violet Grove				Genesee			
	4	5	6	Q2	4	5	6	Q2
NO ₂	100.0	100.0	99.9	100.0	100.0	100.0	94.4	98.1
SO ₂	100.0	100.0	100.0	100.0	100.0	100.0	94.4	98.1
WSP	100.0	100.0	100.0	100.0	100.0	100.0	93.5	97.8
WDR	100.0	100.0	100.0	100.0	100.0	100.0	93.5	97.8
T ₂	100.0	100.0	100.0	100.0	100.0	100.0	94.4	98.1
T ₁₀	100.0	100.0	100.0	100.0	100.0	100.0	94.4	98.1
RH	100.0	100.0	100.0	100.0	100.0	100.0	94.4	98.1

2.4 Mercury Assessment Program

2.4.1 Data Completeness

There were 13 wet deposition sample collection periods in the second quarter of 2006. From these 13 collection periods, 8 precipitation samples were collected, 1 sample collected contained only trace amounts of precipitation (insufficient volume for analysis), while the remaining 4 samples were dry. Frontier Geosciences Inc. rated all 8 precipitation samples as valid. Capture rates for continuous data relevant to the mercury assessment program are presented in Table 10.

In the second quarter of 2006, two sampling platforms were installed at the Genesee station, in preparation for conversion of this station to the National Acid Deposition Program's Mercury Deposition Network (MDN). Completion of conversion to the MDN program is expected in the third quarter of 2006.

Table 10. Data Capture Rates (%) for Precipitation Samples in the Mercury Assessment Program

Station	Genesee			
Month	4	5	6	Q2
PPT	100.0	100.0	94.4	98.1

3 CONCLUSIONS

3.1 Regional Ambient Air Program

There were no notable issues with the regional ambient air program. All continuous data were above 90%. All measured concentrations were also well below applicable ambient air guidelines and standards.

Two intermittent particulate matter samples at the Genesee station failed due to collect due to power outages in the second quarter. A rain shelter has been installed over the power box of one of the samplers to prevent future recurrence. Data capture rates for the passive program in the second quarter were 100% for NO₂, SO₂, and O₃.

3.2 Acid Deposition Program

TSP samples at the Violet Grove station were missed on three sampling events in the second quarter of 2006. During this period, the Partisol unit was out for servicing to replace its mass flow controller. Flows for the Partisol unit had previously displayed incorrect flow times. This problem was repaired once the mass flow controller was replaced and tuned.

3.3 Mercury Assessment Program

There were no notable issues with the mercury assessment program in the first quarter of 2006 (the most recent period for which results were available). Conversion of this site to the National Acid Deposition Program's Mercury Deposition Program (MDN) continued in the second quarter of 2006.