

**TransAlta Utilities Inc./EPCOR Generation Inc. Wabamun-Genesee
Area Air Monitoring Programs**

2007 Third Quarter Report

**Ambient Air Quality Monitoring Program
Acid Deposition Assessment Program
Mercury Assessment Program**

Final

Submitted by:

WBK & Associates Inc.
St Albert, AB

For:

Jacques Whitford AXYS
4208 – 97 Street, Suite 203
Edmonton, AB T6E 5Z9

June 20, 2008

EXECUTIVE SUMMARY

TransAlta Utilities Inc. and EPCOR Generation Inc. operate four coal-fired thermal generating plants – Sundance, Keephills, Wabamun, and Genesee – located in the Wabamun-Genesee area of west-central Alberta. The generating plants operate under Alberta Environmental Protection and Enhancement Act approvals. Under their approvals, the generating 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 third quarter (July, August, and September) of 2007. Completeness of monitoring data, quarterly summary statistics for selected air quality parameters, and contraventions of approval terms and applicable air quality monitoring objectives are summarized and discussed.

Regional Ambient Air Program

There were two instances of invalid or missing data for intermittent PM₁₀ and PM_{2.5} samples out of 60 samples sought during the third quarter in the regional ambient air program. There were no instances of invalid or missing passive sampler results for the third quarter.

Third quarter data capture rates for continuous monitoring parameters at all air monitoring stations – except the Genesee air monitoring station – were well above the 90% criterion on a monthly basis as stipulated in the Air Monitoring Directive (1989). The Genesee air monitoring station experienced power failure from July 17th through to July 22nd, returning uptimes for all analyzers and meteorological equipment of 83.7%. This event was reported to Alberta Environment on July 20th (Reference Number: 190305). High uptimes at other air monitoring stations indicate that equipment in the continuous air monitoring network was generally well-maintained. All measured concentrations were below applicable Alberta Ambient Air Quality Guideline values or Canada Wide Standard values.

The one contravention of approval terms and applicable air quality monitoring objectives – at the Genesee air monitoring station due to power failure in July – was reported to Alberta Environment on July 20th (Reference Number: 190305).

Acid Deposition Assessment Program

There were 27 of 30 valid intermittent TSP samples collected and 12 of 12 valid acid gas samples collected during the third quarter of 2007 for the acid deposition assessment program. All data capture rates were well above 90% for continuous monitoring parameters in the third quarter for the program except for monitor equipment at Genesee AMS. As indicated above, the Genesee AMS experienced power failure from July 17th through to July 22nd, returning uptimes for all analyzers and meteorological equipment of 83.7%.

Mercury Assessment Program

There were thirteen valid precipitation samples collected in the wet deposition sampling program during the third quarter of 2007. There were 60 valid dry deposition samples and 57 QA/QC samples collected in the dry deposition sampling program during the third quarter of 2007.

TABLE OF CONTENTS

| | |
|---|----|
| EXECUTIVE SUMMARY | ii |
| TABLE OF CONTENTS | iv |
| ABBREVIATIONS | v |
| | |
| 1 Introduction | 1 |
| 1.1 Environmental Monitoring Programs for Generating Plants | 2 |
| 1.1.1 Ambient Air Quality Monitoring Program | 2 |
| 1.1.2 Acid Deposition Assessment Program | 4 |
| 1.1.3 Mercury Assessment Program | 5 |
| 1.2 Purpose of Report | 6 |
| | |
| 2 Results and Discussion | 7 |
| 2.1 Regional Ambient Air Quality Monitoring Program | 7 |
| 2.1.1 Data Completeness | 7 |
| 2.1.2 Summary Statistics | 10 |
| 2.2 Acid Deposition Assessment Program | 20 |
| 2.2.1 Data Completeness | 20 |
| 2.3 Mercury Assessment Program | 21 |
| 2.3.1 Data Completeness | 21 |
| 2.4 Contraventions of Special Environmental Monitoring Programs | 22 |
| | |
| 3 Summary | 22 |
| 3.1 Regional Ambient Air Program | 22 |
| 3.2 Acid Deposition Assessment Program | 23 |
| 3.3 Mercury Assessment Program | 23 |

ABBREVIATIONS

| | |
|-------------------------------|--|
| AAAQO | Alberta ambient air quality objective |
| AMS | air monitoring station |
| Ca ²⁺ | calcium ion |
| CWS | Canada Wide Standard |
| EPEA | Environmental Protection and Enhancement Act |
| Hg | mercury |
| HNO ₂ | nitrous acid |
| HNO ₃ | nitric acid |
| K ⁺ | potassium ion |
| Mg ²⁺ | magnesium ion |
| MW | megawatts |
| Na ⁺ | sodium ion |
| NAPS | Nation Air Pollutant Surveillance |
| NH ₄ ⁺ | ammonium ion |
| NO ₂ | nitrogen dioxide |
| NO ₃ ⁻ | nitrate ion |
| MDN | Mercury Deposition Network |
| O ₃ | ozone |
| PM _{2.5} | particulate matter ≤2.5 µm diameter |
| PM ₁₀ | particulate matter ≤10 µm diameter |
| Q1 | first quarter |
| RH | relative humidity |
| RGM | reactive gaseous mercury |
| SO ₂ | sulphur dioxide |
| SO ₄ ²⁻ | sulphate ion |
| SW | surface wetness |
| T ₂ | ambient temperature at 2 m above ground |
| T ₁₀ | ambient temperature at 10 m above ground |
| TSP | total suspended solids |
| WDR | wind direction |
| WSP | wind speed |

1 Introduction

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

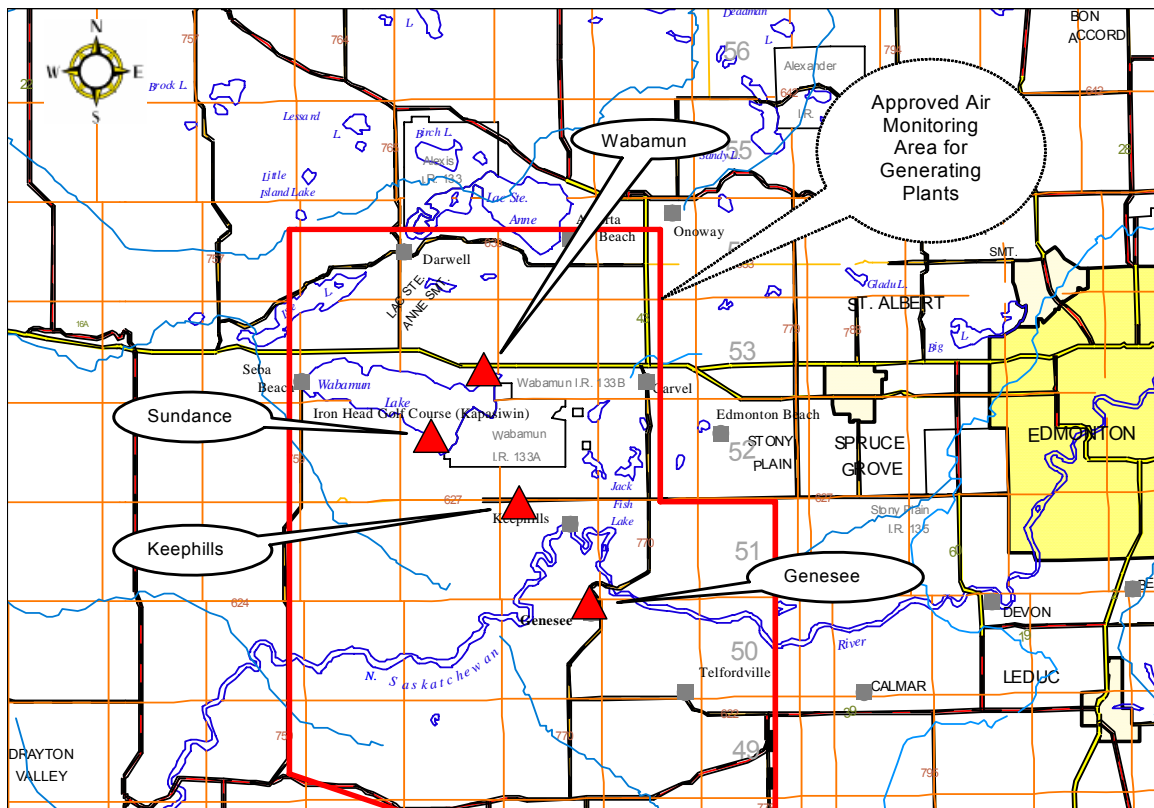


Figure 1 Coal fired generating plant locations in the Wabamun-Genesee area.

Wabamun generating plant is the oldest of TransAlta's three generating plants in the Lake Wabamun area. It is near the Village of Wabamun and has a net generating capacity of 279 MW. Only one generating unit was in operation at the Wabamun generating plant in 2006. The remaining three units were retired in 2002 (Unit 3) and 2004 (Units 1 and 2).

The TransAlta Sundance generating plant consists of six generating units, and is the largest, coal-fired generating plant in western Canada. Sundance is situated on the south shore of Lake Wabamun approximately 70 kilometres (km) west of Edmonton, Alberta (Figure 1). The plant has been in operation since 1970, with steady expansion from a single original generating unit to six generating units throughout the 1970s. Sundance currently has a net generating capacity of 2,020 MW. The Keephills generating plant is located 5 km southeast of Wabamun Lake (Figure 1). It has a net generating capacity of 766 MW, and consists of two generating units. Keephills has been in operation since 1983.

The Genesee generating plant consists of three generating units located 50 km southwest of Edmonton (Figure 1). EPCOR fully owns and operates Units 1 and 2, which have a combined net generating capacity of 762 MW. These units have been in operation since 1994 and 1989, respectively. Genesee 3 (Unit 3), commissioned in 2005, is a 50/50 joint venture between TransAlta and EPCOR. Genesee 3 has a net generating capacity of 450 MW.

1.1 Environmental Monitoring Programs for Generating Plants

The generating plants operate under Alberta Environmental Protection and Enhancement Act (EPEA) approvals listed in Table 1. Under their EPEA approvals, the generating 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 generating 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 generating plants in the Wabamun-Genesee area.

| Facility | Capacity (MW, net) | Location | Approval No. (as amended) | Applicable Approval Terms |
|-----------|--------------------|---------------------------------------|---------------------------|--|
| Wabamun | 279 | 2,3,10,11-53-04 W5M | 10323-02-00 | 6.1.18 to 6.1.24; 6.1.32 to 6.1.34 |
| Sundance | 2,020 | 3,4,8,9,10,16,17,20, and 31-52-04 W5M | 9830-01-00 | 13.1.18 to 13.1.24; 13.1.32 to 13.1.34 |
| Keephills | 766 | 36-51-04 W5M | 10324-01-00 | 6.1.18 to 6.1.24; 6.1.32 to 6.1.37 |
| Genesee | 1,212 | 25-50-03 W5M | 773-02-00 | 7.1.1 to 7.1.9 |

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:

- A continuous monitoring program consisting of four air monitoring stations (AMS) (Figure 2) – Powers, 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 the Powers and Genesee AMS, and ozone (O₃) is measured at the Genesee AMS.

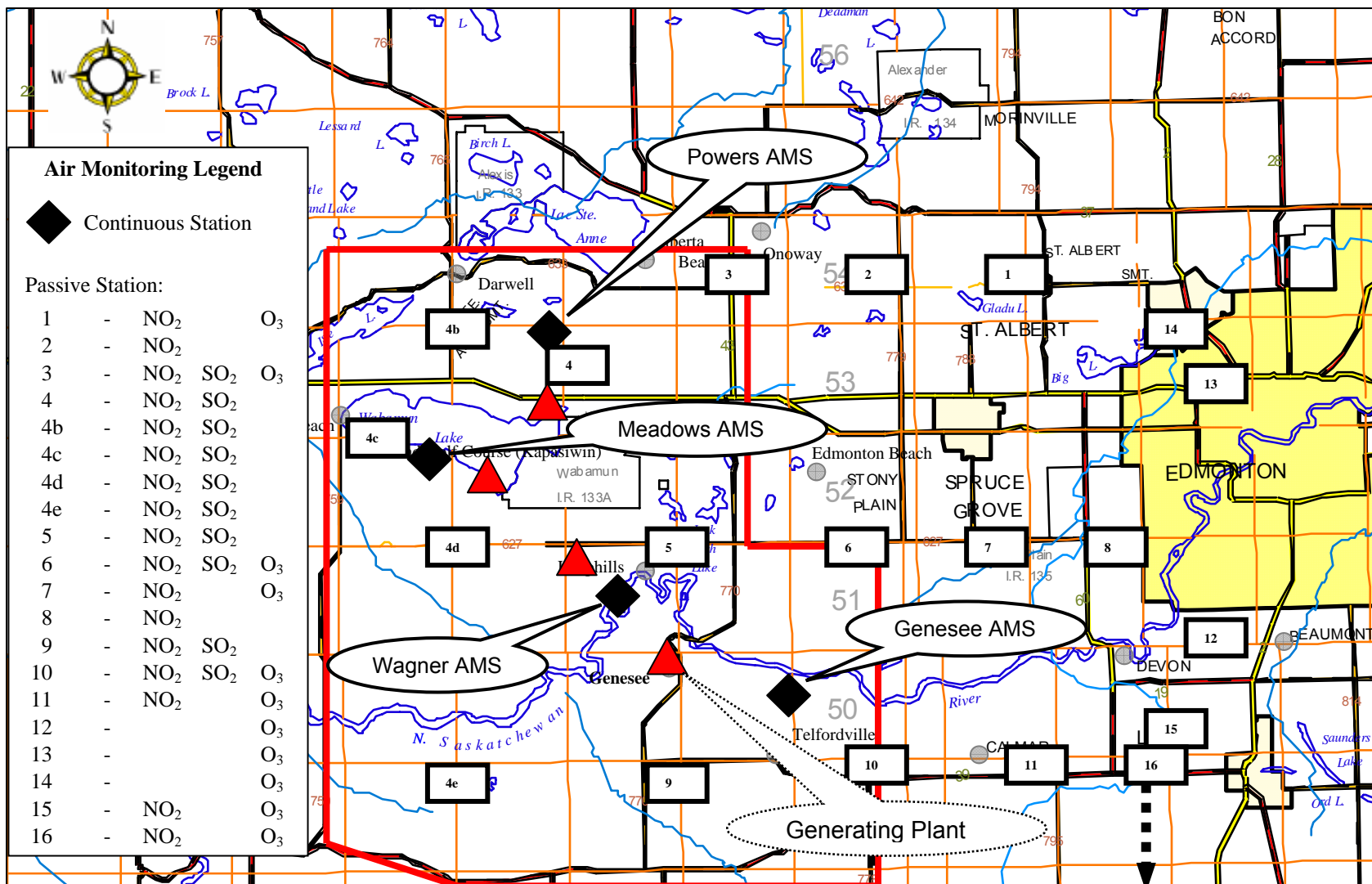


Figure 2 Continuous and passive monitoring locations in Wabamun-Genesee area.

- 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 – Powers AMS and Genesee AMS.
- 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 2. Two additional stations (15 and 16) were added in February 2006. These stations are located outside of the area shown in Figure 2 in the lower right hand corner and monitor NO₂ and O₃.

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

| Parameter | Continuous | Sampled intermittently – every 6 th day according to NAPS schedule | Sampled monthly (passives) |
|---|------------|---|----------------------------|
| SO ₂ | • | | • |
| NO ₂ | • | | • |
| O ₃ | • | | • |
| PM ₁₀ | | • | |
| PM _{2.5} | • | • ^a | |
| Wind speed and direction, temperature, relative humidity) | • | | |

^a Includes metals speciation.

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 2) and the Violet Grove air monitoring station. The four coal-fired generating plants are located at distances of 8 to 33 km away from the Genesee AMS. The Violet Grove station is not shown in Figure 2; it is located in the lower left hand corner of figure and southwest of regional monitoring area. The four generating plants are located at distances of 55 to 60 km away from the Violet Grove station.

The following types of deposition are currently measured at these two stations:

Wet Deposition

Wet deposition monitoring involves collecting rain and snow samples using a wet-only precipitation sampler. Precipitation samples are retrieved from the field monthly or as necessary (e.g., after intense precipitation events) and sent to Alberta Research Council (Vegreville, AB) for chemical analysis.

Dry Deposition

Dry deposition monitoring involves measuring and recording concentrations of the following atmospheric pollutants and meteorological parameters:

Atmospheric Pollutants

Atmospheric pollutants measured for dry deposition include eleven species:

- Continuous measurements for SO₂ and NO₂.
- Monthly integrated annular denuder samples for HNO₃ and HNO₂.
- One 24-hour integrated particulate matter (TSP) sample collected every 6th day for Na⁺, K⁺, Mg²⁺, Ca²⁺, NH₄⁺, SO₄²⁻, and NO₃⁻.

Meteorological Parameters

Hourly average measured values were obtained for the following meteorological parameters:

- Wind speed (WSP).
- Wind direction standard deviation (WDR).
- Relative humidity (RH).
- Surface wetness (SW).
- Air temperature at surface (2 m), T₂.
- Air temperature at standard height (10 m), T₁₀; or difference in air temperature at standard height and surface.

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 measure wet and dry deposition rates of mercury in the Wabamun-Genesee region to understand potential effects of generating plant emissions on receptors in the area.

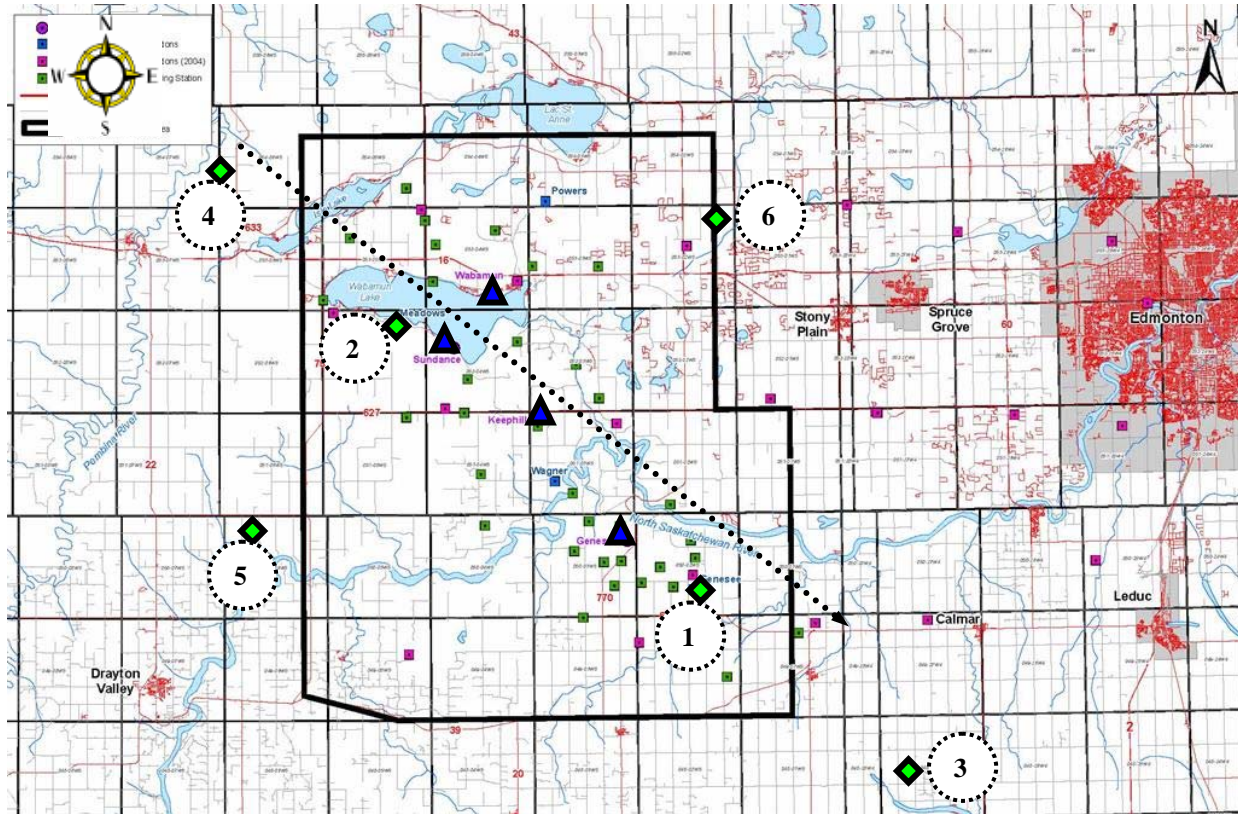
Wet Deposition

Wet deposition monitoring is conducted at the Genesee air monitoring station (Figure 2). Wet deposition samples are collected on a weekly basis from this station – with sample change outs occurring every Tuesday. This monitoring program is part of the U.S. National Acid Deposition Program – Mercury Deposition Network (MDN) (<http://nadp.sws.uiuc.edu/mdn/>). The objective of the MDN is to develop a database of weekly concentrations of total mercury in precipitation and the seasonal and annual flux of total mercury in wet deposition across North America. The data are being used to develop information on spatial and seasonal trends in mercury deposited to surface waters, forested watersheds, and other sensitive receptors. There are over 85 wet deposition sampling sites in North America currently in operation. The network uses standardized methods for collection and analyses.

Dry Deposition

A full dry deposition monitoring component was designed with the approval of Alberta Environment. The field program commenced during the second week of March 2007. Seven-day I.C.E. 450 cation-exchange (ion exchange) membrane samples are being collected at six sites throughout the Wabamun-Genesee area (Figure 3) using the same schedule as the

MDN (sample change outs occur on Tuesday of each week). Membrane samples are sent weekly to Frontier GeoSciences Inc. (Seattle, WA) for analysis of Hg^{2+} (reactive gaseous mercury or RGM) and results are received within 90 days.



Legend:

- ▲ Coal-fired generating plant
- ◆ Hg dry deposition monitoring location

Figure 3 Locations of six sampling sites in Hg dry deposition monitoring program.

1.2 Purpose of Report

This quarterly report summarizes key results of data collected in the third quarter (July to September) of the calendar year 2007. Specifically, completeness of monitoring data, quarterly summary statistics for selected air quality parameters, and contraventions of approval terms and applicable air quality monitoring objectives are summarized and discussed.

2 Results and Discussion

2.1 Regional Ambient Air Quality Monitoring Program

2.1.1 Data Completeness

Data capture rates for PM₁₀ and PM_{2.5} intermittent samples are listed in Table 3. There were two instances of invalid or missing data for intermittent PM₁₀ and PM_{2.5} samples out of 60 samples sought during the third quarter (Table 4).

Table 3 Data capture rates for intermittent PM₁₀ and PM_{2.5} monitoring during third quarter 2007.

| Month: | Powers AMS | | | | Genesee AMS | | | |
|---------------------|------------|-----|-----|-------|-------------|-----|-----|-------|
| | 7 | 8 | 9 | Q3 | 7 | 8 | 9 | Q3 |
| PM ₁₀ : | 5/5 | 5/5 | 5/5 | 15/15 | 3/6 | 5/5 | 5/5 | 13/15 |
| PM _{2.5} : | 5/5 | 5/5 | 5/5 | 15/15 | 5/6 | 5/5 | 5/5 | 15/15 |

Note: 7 = July, 8 = August, 9 = September.

Table 4 Incidences of invalid or missing intermittent PM₁₀ and PM_{2.5} data during third quarter 2007.

| Date | Station | Parameter | Cause | Corrective Action |
|--------|-------------|------------------|---|-----------------------------|
| Jul 5 | Genesee AMS | PM ₁₀ | Sampler malfunction – pump did not run. | Sampler timer reprogrammed. |
| Jul 23 | Genesee AMS | PM ₁₀ | Power failure – pump did not run. | Sampler timer reprogrammed. |

Data capture rates for passive samples are presented in Table 5. There were no instances of invalid or missing passive results for the third quarter of 2007.

Table 5 Data capture rates for passive monitoring parameters during third quarter 2007.

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

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

Third quarter (Q3) 2007 uptimes for continuous monitoring equipment and air monitoring stations are summarized in Table 6. Data capture rates for continuous monitoring parameters at all air monitoring stations were well above the 90% criterion on a monthly basis as stipulated

in the Air Monitoring Directive (1989), except as noted. High uptimes indicate that equipment in the continuous air monitoring network was generally well-maintained. The following comments are noted:

Powers AMS:

- The station experienced data acquisition failure, returning an uptime of 99.9% on all analyzers and meteorological equipment in July. In addition, the PM_{2.5} analyzer experienced unstable operation, returning an uptime of 96.1% in July.
- The PM_{2.5} analyzer experienced unstable operation in August, returning an uptime of 98.4%.
- The PM_{2.5} analyzer experienced unstable operation, returning an uptime of 97.9% and the temperature and relative humidity monitors experienced data acquisition failure, returning uptimes of 99.7% in September.

Meadows AMS:

- The SO₂ and NO/NO₂/NO_x analyzers underwent maintenance in July, returning uptimes of 98.5% and the station experienced a brief data acquisition failure event, returning an uptime of 99.9% for other analyzers.
- The station experienced a data acquisition failure event in August, returning uptimes of 99.5% for all analyzers.
-

Wagner AMS:

- The temperature monitor experienced data acquisition failure, returning an uptime of 99.9% in September

Genesee AMS:

- The station experienced a power failure on July 17th which damaged electrical circuitry. The station was not brought back online until July 22nd, returning uptimes of 83.7%. This incident was reported to Alberta Environment on July 20th (Reference Number: 190305). The PM_{2.5} analyzer experienced unstable operation yielding an uptime of 81.6% in July.
- The station experienced a brief data acquisition failure in August, returning uptimes of 99.9% on all analyzers and meteorological equipment. In addition, the precipitation sampler underwent maintenance during August, returning an uptime of 99.7% and the PM_{2.5} analyzer experienced unstable operation, yielding an uptime of 99.1%.
- The station experienced a brief data acquisition failure, returning uptimes of 99.9% on all analyzers in September. In addition, the temperature and O₃ analyzers experienced additional data acquisition failures during the month, returning an uptime of 99.7%; and the PM_{2.5} analyzer experienced unstable operation, yielding an uptime of 99.4%.

Table 6 Data capture rates (%) for continuous monitoring parameters during Q3 2007.

| Month: | Powers AMS | | | | Meadows AMS | | | | Wagner AMS | | | | Genesee AMS | | | |
|-------------------|------------|------|------|------|-------------|------|-----|------|------------|-----|------|------|-------------|------|------|------|
| | 7 | 8 | 9 | Q3 | 7 | 8 | 9 | Q3 | 7 | 8 | 9 | Q3 | 7 | 8 | 9 | Q3 |
| NO ₂ | 99.9 | 100 | 100 | 99.9 | 98.5 | 99.5 | 100 | 99.3 | 100 | 100 | 100 | 100 | 83.7 | 99.9 | 99.9 | 94.5 |
| SO ₂ | 99.9 | 100 | 100 | 99.9 | 98.5 | 99.5 | 100 | 99.3 | 100 | 100 | 100 | 100 | 83.7 | 99.9 | 99.4 | 94.3 |
| 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 | 83.7 | 99.9 | 99.9 | 94.5 |
| PM _{2.5} | 96.1 | 98.4 | 97.9 | 97.5 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 81.6 | 99.1 | 99.4 | 93.4 |
| WSP | 99.9 | 100 | 100 | 99.9 | 99.9 | 99.5 | 100 | 99.3 | 100 | 100 | 100 | 100 | 83.7 | 99.9 | 99.9 | 94.5 |
| WDR | 99.9 | 100 | 100 | 99.9 | 99.9 | 99.5 | 100 | 99.3 | 100 | 100 | 100 | 100 | 83.7 | 99.9 | 99.9 | 94.9 |
| T ₂ | 99.9 | 100 | 99.7 | 99.8 | 99.9 | 99.5 | 100 | 99.3 | 100 | 100 | 99.9 | 99.9 | 83.7 | 99.9 | 99.7 | 94.4 |
| 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 | 83.7 | 99.9 | 99.9 | 94.5 |
| RH | 99.9 | 100 | 99.7 | 99.9 | 99.9 | 99.5 | 100 | 99.3 | 100 | 100 | 100 | 100 | 83.7 | 99.9 | 99.9 | 94.5 |

Note: 7 = July, 8 = August, 9 = September.
WSP = wind speed.
WDR = wind direction.
T₂ = temperature at 2 metre height above ground.
T₁₀ = temperature at 10 metre height above ground.
RH = relative humidity.
n/a = not applicable.
Bolded values indicate <90% uptime.

2.1.2 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. Box-and-whisker plots presented here specifically show five values for individual pollutants collected at each station during Q3 2007:

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

The bottom whisker is not shown in these plots because the values represented by the bottom whiskers are unessential. Box-and-whisker plots are presented for Q3 2007 for the following:

- 1-hour average NO₂ concentrations from continuous monitoring (Figure 4)
- 24-hour average NO₂ concentrations from continuous monitoring (Figure 5)
- 1-hour average SO₂ concentrations from continuous monitoring (Figure 6)
- 24-hour average SO₂ concentrations from continuous monitoring (Figure 7)
- 1-hour average O₃ concentrations from continuous monitoring (Figure 8)
- 8-hour average O₃ concentrations from continuous monitoring (Figure 9)
- 24-hour average PM_{2.5} concentrations from continuous monitoring (Figure 10)
- 24-hour average PM₁₀ concentrations from intermittent monitoring (Figure 11)
- 24-hour average PM_{2.5} concentrations from intermittent monitoring (Figure 12)

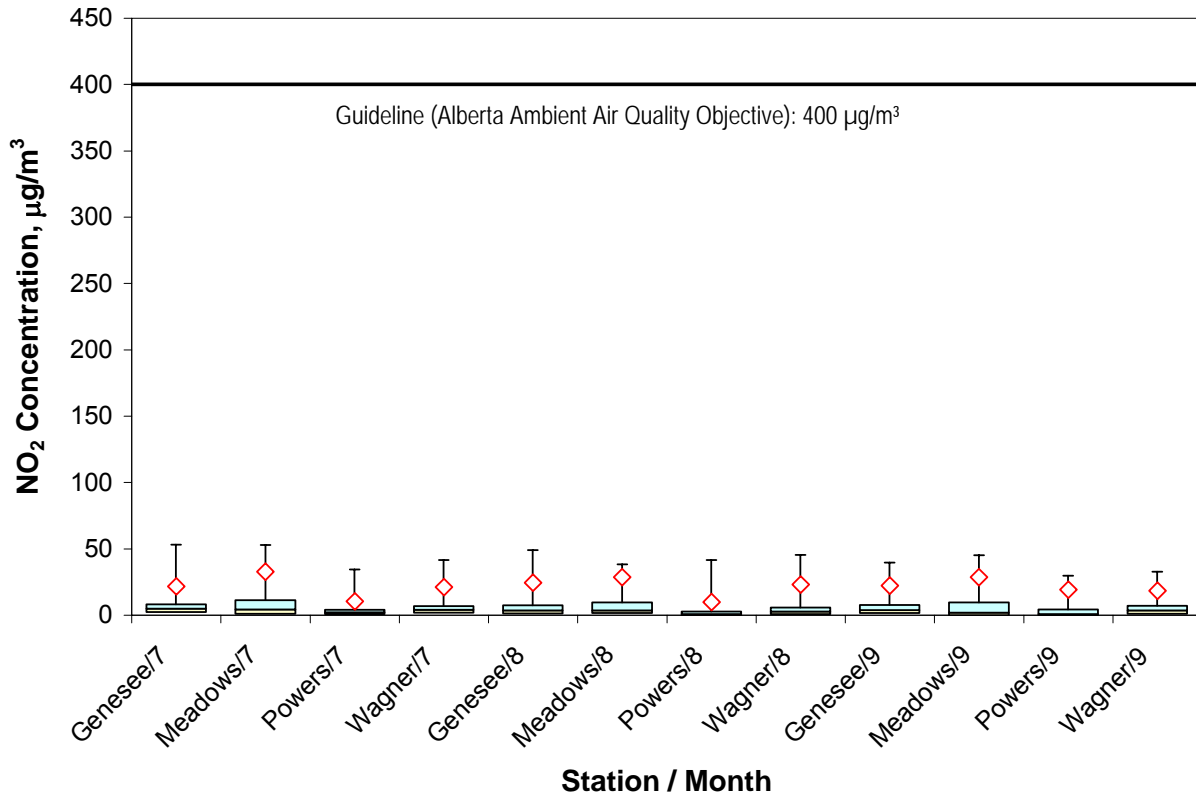


Figure 4 Box-and-Whisker plot of 1-hour average NO₂ concentrations from continuous monitoring at selected air monitoring stations (Q3 2007).

Note: 7 = July, 8 = August, 9 = September; 25th %ile (bottom of box);
 50th %ile (horizontal line within box); 75th %ile (top of box);
 98th percentile (diamond); maximum (top T)

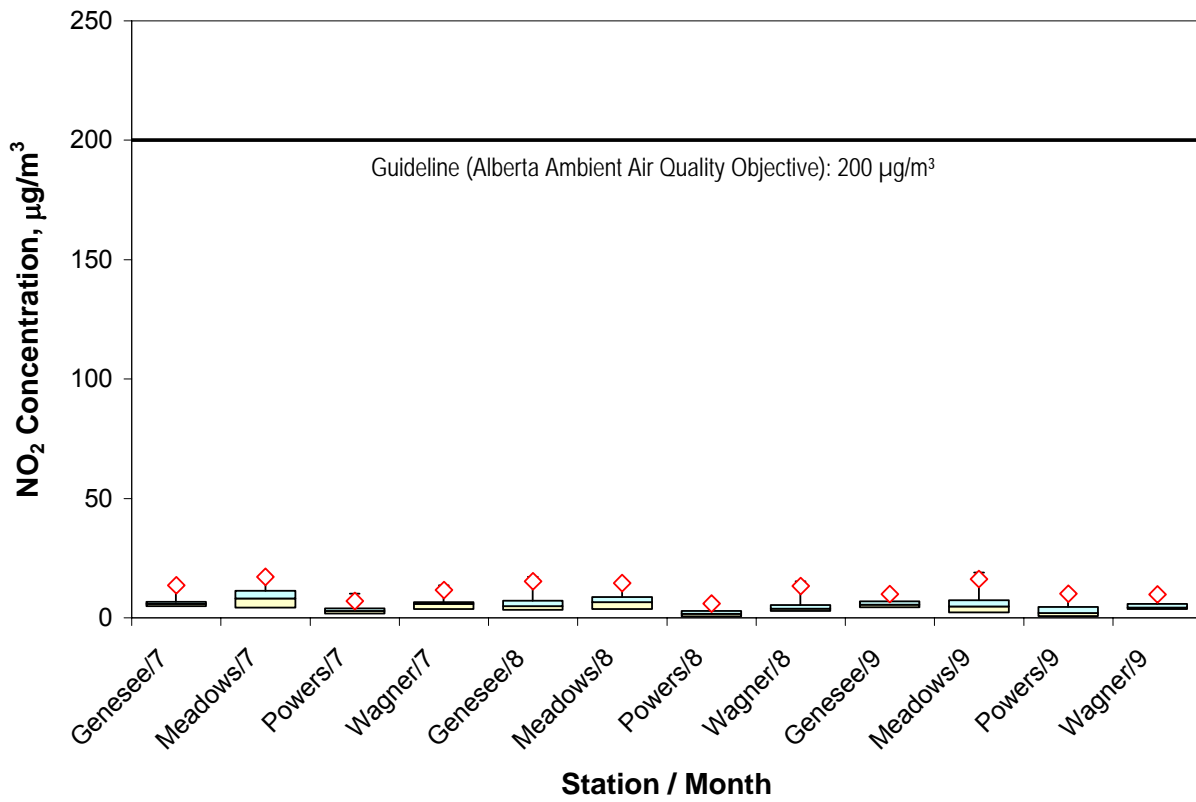


Figure 5 Box-and-Whisker plot of 24-hour average NO₂ concentrations from continuous monitoring at selected air monitoring stations (Q3 2007).

Note: 7 = July, 8 = August, 9 = September;
 25th %ile (bottom of box);
 50th %ile (horizontal line within box);
 75th %ile (top of box);
 98th percentile (diamond);
 maximum (top T)

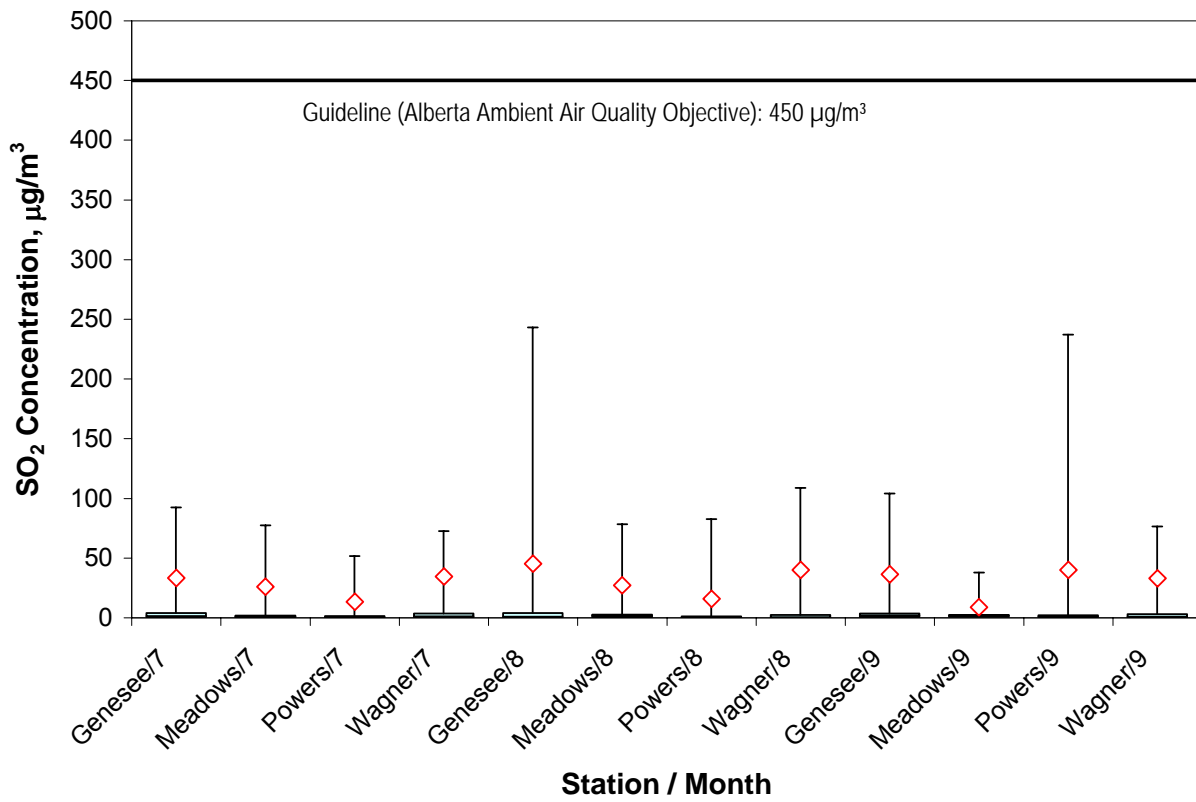


Figure 6 Box-and-Whisker plot of 1-hour average SO₂ concentrations from continuous monitoring at selected air monitoring stations (Q3 2007).

Note: 7 = July, 8 = August, 9 = September;
 25th %ile (bottom of box);
 50th %ile (horizontal line within box);
 75th %ile (top of box);
 98th percentile (diamond);
 maximum (top T)

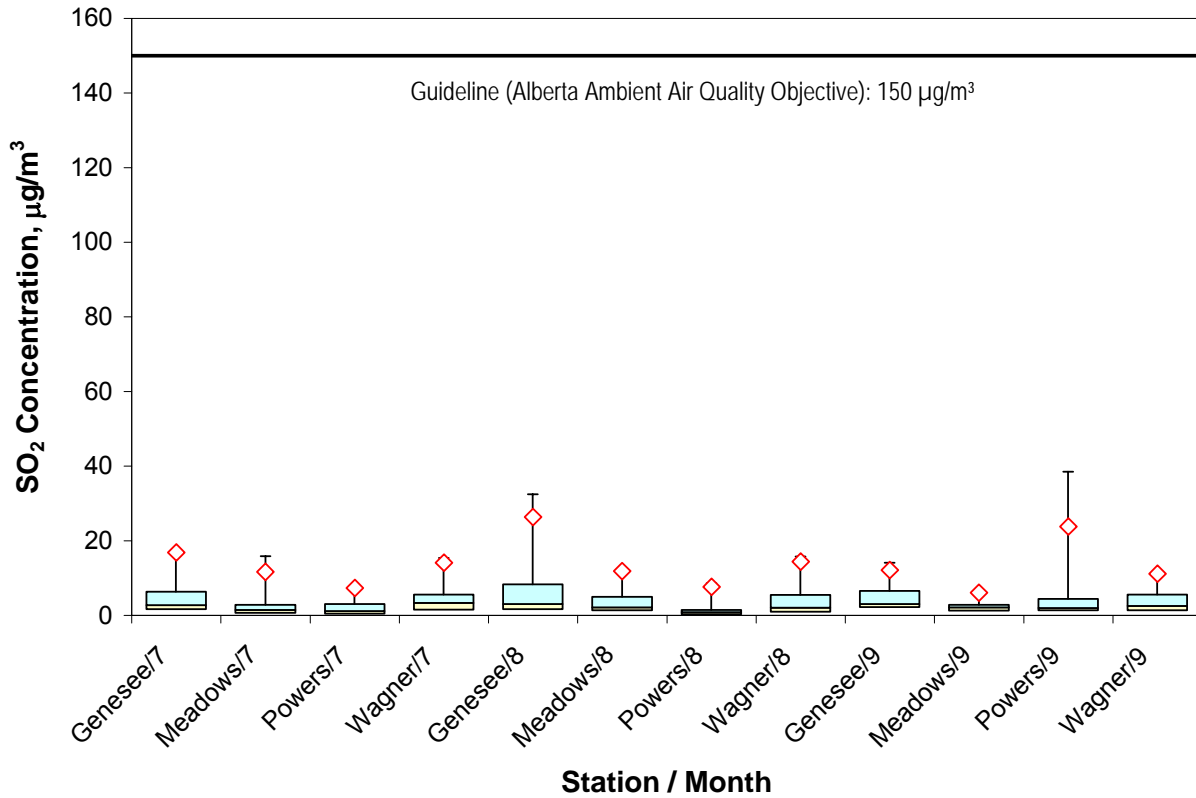


Figure 7 Box-and-Whisker plot of 24-hour average SO₂ concentrations from continuous monitoring at selected air monitoring stations (Q3 2007).

Note: 7 = July, 8 = August, 9 = September; 25th %ile (bottom of box);
 50th %ile (horizontal line within box); 75th %ile (top of box);
 98th percentile (diamond); maximum (top T)

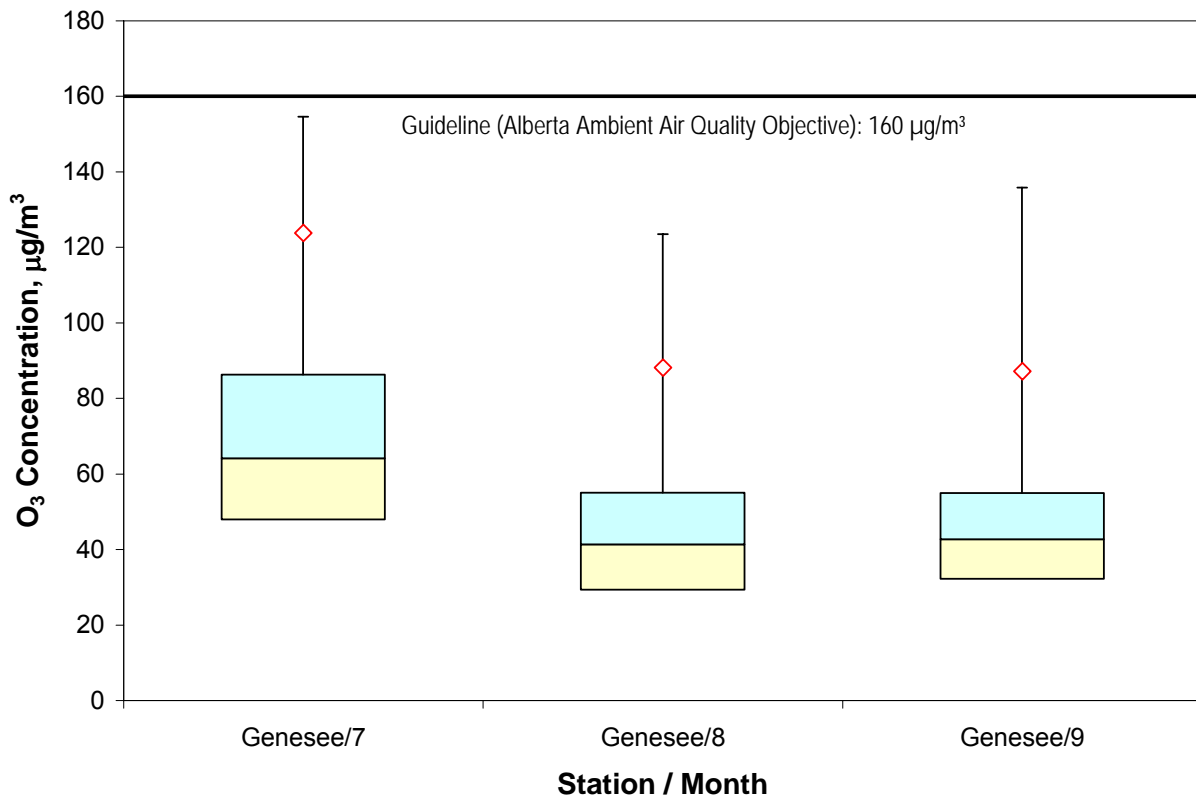


Figure 8 Box-and-Whisker plot of 1-hour average O₃ concentrations from continuous monitoring at Genesee AMS (Q3 2007).

Note: 7 = July, 8 = August, 9 = September;
 25th %ile (bottom of box);
 50th %ile (horizontal line within box);
 75th %ile (top of box);
 98th percentile (diamond);
 maximum (top T)

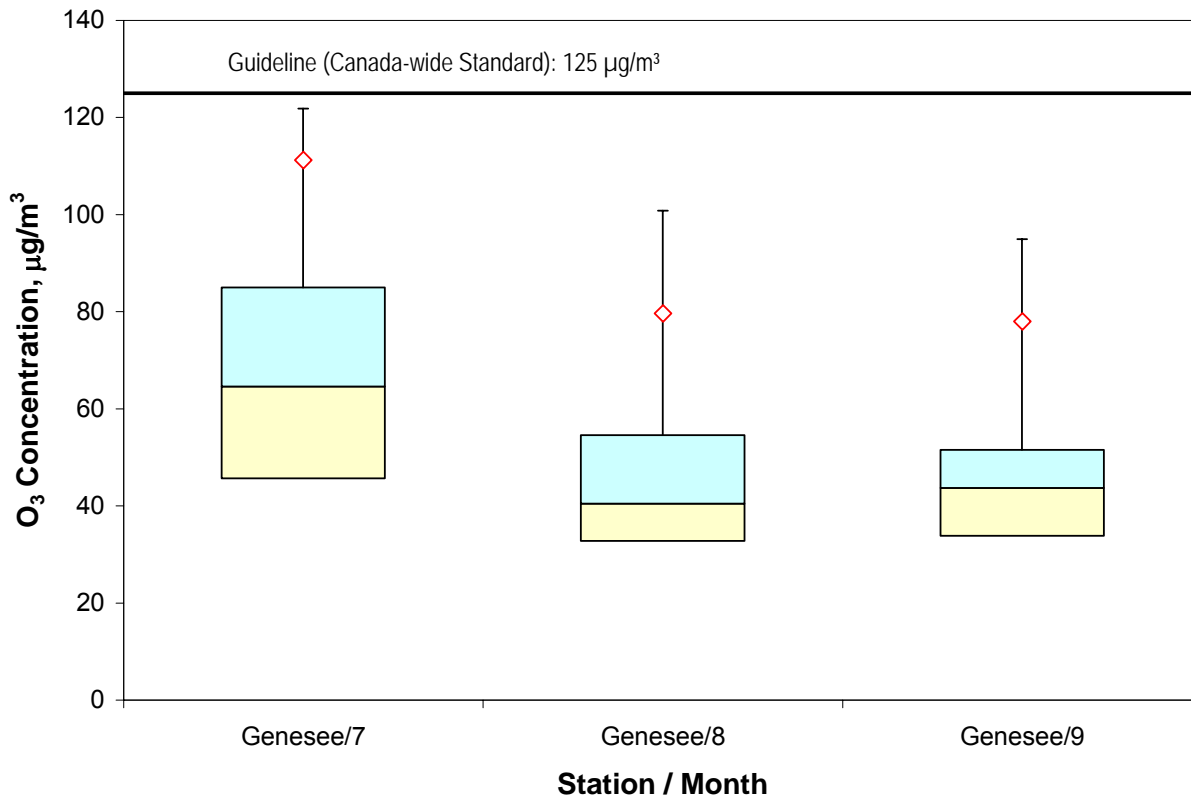


Figure 9 Box-and-Whisker plot of 8-hour average O_3 concentrations from continuous monitoring at Genesee AMS (Q3 2007).

Note: 7 = July, 8 = August, 9 = September;
 25th %ile (bottom of box);
 50th %ile (horizontal line within box);
 75th %ile (top of box);
 98th percentile (diamond);
 maximum (top T)

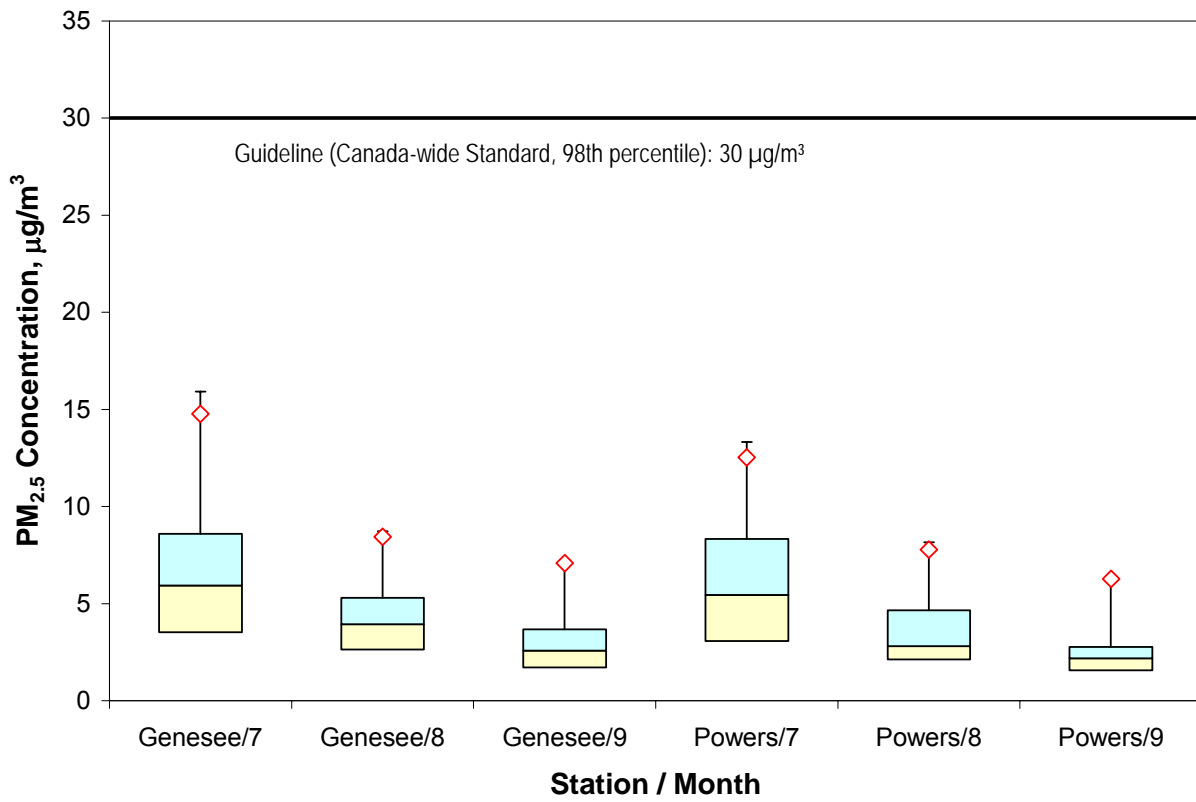


Figure 10 Box-and-Whisker plot of 24-hour average $\text{PM}_{2.5}$ concentrations from continuous monitoring at Genesee and Powers air monitoring stations (Q3 2007).

Note: 7 = July, 8 = August, 9 = September;
 25th %ile (bottom of box);
 50th %ile (horizontal line within box);
 98th percentile (diamond);

75th %ile (top of box);
 maximum (top T)

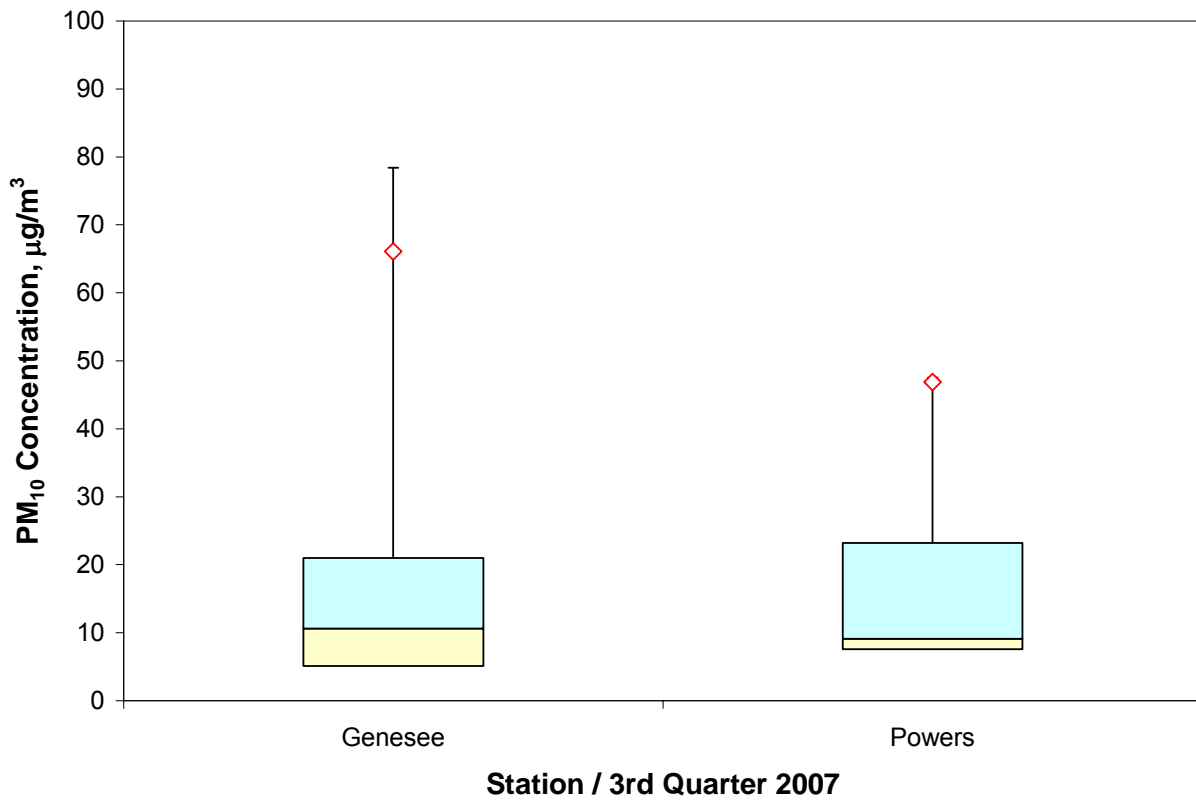


Figure 11 Box-and-Whisker plot of 24-hour average PM_{10} concentrations from intermittent monitoring at Genesee and Powers air monitoring stations (Q3 2007).

Note: 25th %ile (bottom of box);
 50th %ile (horizontal line within box);
 98th percentile (diamond);
 75th %ile (top of box);
 maximum (top T)

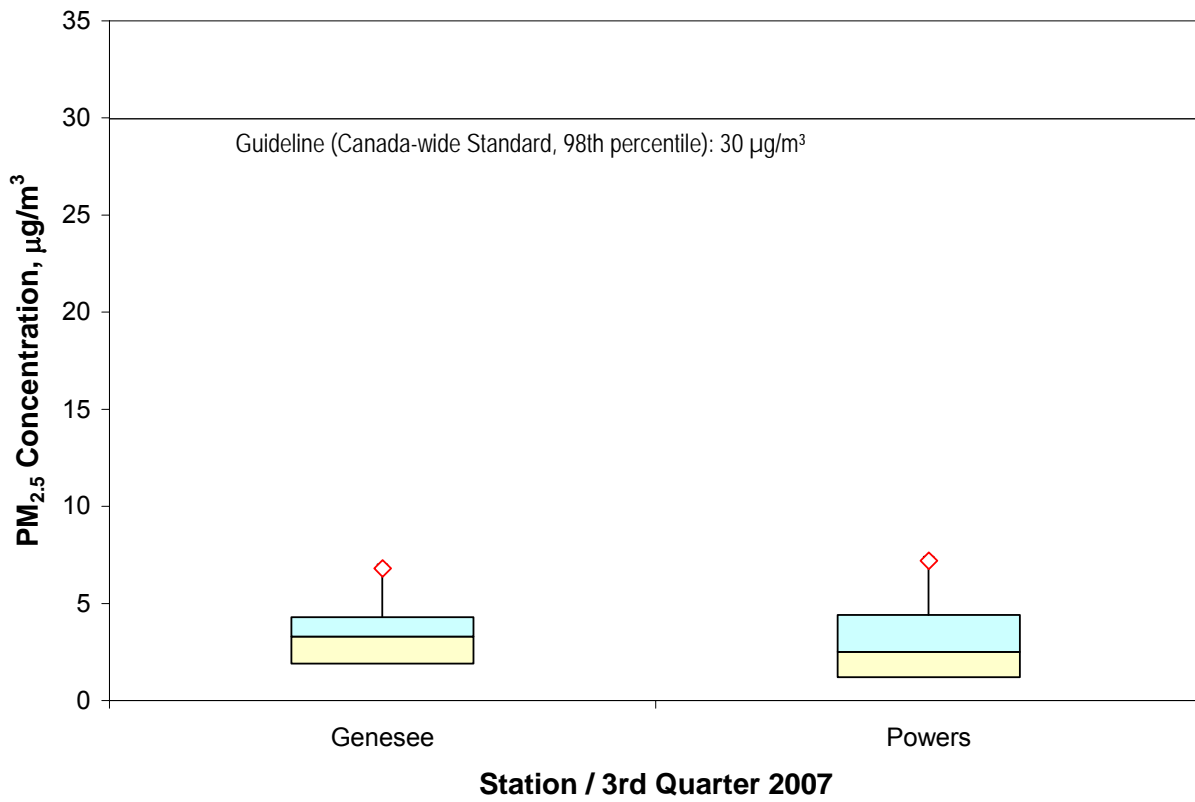


Figure 12 Box-and-Whisker plot of 24-hour average $\text{PM}_{2.5}$ concentrations from intermittent monitoring at Genesee and Powers stations in central Alberta (Q3 2007).

Note: 25th %ile (bottom of box);
 50th %ile (horizontal line within box);
 98th percentile (diamond);
 75th %ile (top of box);
 maximum (top T)

All measured concentrations were below applicable AAAQOs or Canada Wide Standard (CWS) values shown in these figures at each of the air monitoring stations.

2.2 Acid Deposition Assessment Program

2.2.1 Data Completeness

Data capture rates for the acid deposition program integrated samples are presented in Table 7 for the third quarter of 2007. There were three incidents of invalid or missing data out of 42 samples sought (Table 8).

Table 7 Capture rates for integrated data for the acid deposition assessment program (Q3 2007).

| Station | Violet Grove AMS | | | | Genesee MAS | | | |
|------------------|------------------|-----|-----|-------|-------------|-----|-----|-------|
| | 7 | 8 | 9 | Q3 | 7 | 8 | 9 | Q3 |
| TSP | 3/5 | 5/5 | 5/5 | 13/15 | 5/5 | 4/5 | 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 |

Note: 7 = July, 8 = August, 9 = September.

Data capture rates expressed as: valid samples/total samples scheduled.

Table 8 Incidences of invalid or missing data for the acid deposition assessment program (Q3 2007).

| Date | Station | Parameter | Cause | Corrective Action |
|--------|------------------|-----------|---|-----------------------------|
| Jul 5 | Violet Grove AMS | TSP | Sampler malfunction – pump did not run. | Sampler timer reprogrammed. |
| Jul 11 | Violet Grove AMS | TSP | Sampler malfunction – pump did not run. | Sampler timer reprogrammed. |
| Aug 10 | Genesee AMS | TSP | Sampler malfunction – pump did not run. | Sampler timer reprogrammed. |

Table 9 shows data capture rates for continuous data collected at the Violet Grove and Genesee air monitoring stations for the acid deposition assessment program. Genesee AMS experienced a power failure on July 17th which damaged electrical circuitry. The station was not brought back online until July 22nd, returning uptimes of 83.7%.

Genesee AMS experienced a brief data acquisition failure in August, returning uptimes of 99.9% on all analyzers. In addition, the precipitation collector experienced additional data acquisition failure during the month, returning an uptime of 99.7%. The station experienced a brief data acquisition failure, returning uptimes of 99.9% on all analyzers in September. In addition, the temperature analyzer experienced additional data acquisition failure during the month, returning an uptime of 99.7%.

Table 9 Capture rates (%) for continuous data for the acid deposition assessment program (Q3 2007).

| Station | Violet Grove AMS | | | | Genesee AMS | | | |
|-----------------|------------------|-----|-----|-----|-------------|------|------|------|
| | 7 | 8 | 9 | Q3 | 7 | 8 | 9 | Q3 |
| NO ₂ | 100 | 100 | 100 | 100 | 83.7 | 99.9 | 99.9 | 94.5 |
| SO ₂ | 100 | 100 | 100 | 100 | 83.7 | 99.9 | 99.9 | 94.5 |
| WSP | 100 | 100 | 100 | 100 | 83.7 | 99.9 | 99.9 | 94.5 |
| WDR | 100 | 100 | 100 | 100 | 83.7 | 99.9 | 99.9 | 94.5 |
| T ₂ | 100 | 100 | 100 | 100 | 83.7 | 99.9 | 99.7 | 94.4 |
| T ₁₀ | 100 | 100 | 100 | 100 | 83.7 | 99.9 | 99.7 | 94.4 |
| RH | 100 | 100 | 100 | 100 | 83.7 | 99.9 | 99.9 | 94.5 |
| PR | 100 | 100 | 100 | 100 | 83.7 | 99.7 | 99.9 | 94.4 |

Note: 7 = July, 8 = August, 9 = September.

WSP = wind speed.

WDR = wind direction.

T₂ = temperature at 2 metres height above ground.

T₁₀ = temperature at 10 metres height above ground.

RH = relative humidity.

PR = precipitation.

n/a = not applicable.

Bolded values indicate <90% uptime.

2.3 Mercury Assessment Program

2.3.1 Data Completeness

Wet Deposition Program – There were 13 wet deposition sample collection periods (weeks) in the third quarter of 2007. From these 13 collection periods, 13 precipitation samples were submitted. Frontier Geosciences Inc. rated all precipitation samples as valid. Data capture rates for integrated sample data relevant to the mercury assessment (wet deposition) program are presented in Table 10.

Table 10 Capture rates for precipitation samples in the mercury assessment (wet deposition) sampling program (Q3 2007).

| Station | Genesee AMS | | | |
|--------------------------|-------------|-----|-----|-------|
| | 7 | 8 | 9 | Q3 |
| Hg wet deposition sample | 5/5 | 4/4 | 4/4 | 13/13 |

Note: 7 = July, 8 = August, 9 = September.

Dry Deposition Program – The sampling strategy associated with the dry deposition program for the third quarter of 2007 involved deploying the ion exchange membrane samples for periods of 7 days or 14 days. In this case, seven deployment periods were for 7 days and three deployment periods were for 14 days at each of the sites during the July to September 2007 period – resulting in 10 dry deposition samples collected from each site. From these 10

collection periods, all samples were collected and submitted from each of the six sampling sites (Figure 3) for a total of 60 field samples. Frontier Geosciences Inc. rated all dry deposition samples as valid.

The dry deposition sampling program involves the collection of trace (nanogram) levels of RGM in the atmosphere. Another important component of the dry deposition program involves collection of Quality Assurance/Quality Control (QA/QC) samples to assist in the determination of representative levels of RGM in the atmosphere that is free from interferences. These interferences may arise from:

- background contamination associated with handling the ion exchange membranes in the field and laboratory
- use of inconsistent field and laboratory measurement procedures

To address the issue of potential interferences, the program also collects numerous QA/QC samples. Specifically, 12 laboratory blanks, 27 field blanks, and 18 replicate samples (for a total of 57 QA/QC samples) were simultaneously collected during the July to September 2007 period.

2.4 Contraventions of Special Environmental Monitoring Programs

There was one contravention of approval terms and applicable air quality monitoring objectives at the Genesee air monitoring station due to power failure for the July to September 2007 period. This incident was reported to Alberta Environment on July 20th (Reference Number: 190305).

3 Summary

3.1 Regional Ambient Air Program

There were two instances of invalid or missing data for intermittent PM₁₀ and PM_{2.5} samples out of 60 samples sought during the third quarter in the regional ambient air program. There were no instances of invalid or missing passive sampler results for the third quarter.

Third quarter data capture rates for continuous monitoring parameters at all air monitoring stations – except the Genesee air monitoring station – were well above the 90% criterion on a monthly basis as stipulated in the Air Monitoring Directive (1989). The Genesee air monitoring station experienced power failure from July 17th through to July 22nd, returning uptimes for all analyzers and meteorological equipment of 83.7%. This event was reported to Alberta Environment on July 20th (Reference Number: 190305).

High uptimes at other air monitoring stations indicate that equipment in the continuous air monitoring network was generally well-maintained. All measured concentrations were below applicable Alberta Ambient Air Quality Guideline values or Canada Wide Standard values.

The one contravention of approval terms and applicable air quality monitoring objectives – at the Genesee air monitoring station due to power failure in July – was reported to Alberta Environment on July 20th (Reference Number: 190305).

3.2 *Acid Deposition Assessment Program*

There were 27 of 30 valid intermittent TSP samples collected and 12 of 12 valid acid gas samples collected during the third quarter of 2007 for the acid deposition assessment program. All data capture rates were well above 90% for continuous monitoring parameters in the third quarter for the program except for monitor equipment at Genesee AMS. As indicated above, the Genesee AMS experienced power failure from July 17th through to July 22nd, returning uptimes for all analyzers and meteorological equipment of 83.7%.

3.3 *Mercury Assessment Program*

There were thirteen valid precipitation samples collected in the wet deposition sampling program during the third quarter of 2007. There were 60 valid dry deposition samples and 57 QA/QC samples collected in the dry deposition sampling program during the third quarter of 2007.