# Air Quality Monitoring

## Whitemud Drive Area of Edmonton

Alberta Environment

June 2000 to June 2001 Final Report


### Summary

Alberta Environment conducted a mobile, ambient air quality monitoring study at six locations near Whitemud Drive in west Edmonton. The study consisted of four surveys, over four seasons, for one year. The objectives of monitoring this area were: (1) to determine concentrations of air pollutants representative of the monitored locations near Whitemud Drive; (2) to compare air pollutant levels to data from permanent monitoring stations in Edmonton; and (3) to compare air pollutant levels to Alberta's air quality guidelines.

Alberta Environment conducts mobile air quality surveys each year as part of its air quality monitoring program. These monitoring surveys are unannounced and use the department's Mobile Air Monitoring Laboratory (MAML). Pollutants measured by the MAML included carbon monoxide, oxides of nitrogen, ozone, particulates, hydrocarbons, sulphur dioxide, hydrogen sulphide, total reduced sulphur and ammonia.

The MAML was used to monitor air quality at six sites in the Whitemud Drive area between 53rd Avenue and Anthony Henday Drive. A total of 191 hours of data were collected by the MAML on 16 days representing each season (four days in each season). Monitoring was conducted for a minimum of one hour at each site so that air pollutant levels could be compared to Alberta's one-hour air quality guidelines. Data collected by the MAML is presented in part one of this report.

An additional 32 air samples were collected near Whitemud Drive and were analyzed for major volatile organic compounds (VOCs) such as benzene, toluene, ethylbenzene and xylenes. These samples were collected primarily during the morning and afternoon traffic rush hours so that maximum VOC levels could be determined. VOC data collected during this survey are presented in part two of this report.


### Findings

(1) No major air quality issues were identified in the Whitemud Drive survey area based on this monitoring survey. Ambient levels of all air quality parameters measured by the MAML were below Alberta's Ambient Air Quality Guidelines. However, the one-hour benzene guideline was exceeded in one of 32 VOC samples. Alberta has one-hour air quality guidelines for benzene, carbon monoxide, nitrogen dioxide, ozone, sulphur dioxide, hydrogen sulphide and ammonia. Maximum one-hour concentrations were:


ISBN No 0-7785-2065-X (Printed Edition)
ISBN No. 0-7785-2019-8 (On-Line Edition)
Pub No. T/643 (Printed, On-Line Edition)
**September 19, 2002**

- 1.17 times the one-hour guideline for benzene;
- 21% of the one-hour guideline for carbon monoxide;
- 19% of the one-hour guideline for nitrogen dioxide;
- 72% of the one-hour guideline for ozone;
- 9% of the one-hour guideline for sulphur dioxide;
- 30% of the one-hour guideline for hydrogen sulphide; and
- 2% of the one-hour guideline for ammonia.

(2) With the exception of one sample, VOC levels (benzene, toluene, ethylbenzene and xylene) were low near Whitemud Drive. However, the one-hour guideline for benzene was exceeded in one sample collected during the morning traffic rush hour on June 13, 2001 in the Elmwood community (164$^{th}$ Street and 80$^{th}$ Avenue). This sample was collected about 100 m from Whitemud Drive during light and variable wind conditions and may have been caused by vehicle emissions from Whitemud Drive. The benzene concentration in this sample was 35 $\mu g/m^3$ (micrograms of benzene per cubic metre of air) compared to the one-hour guideline of 30 $\mu g/m^3$. The one-hour ambient guideline for benzene in Alberta is the most stringent in North America, and is 100 times more stringent than the U.S. Department of Health and Human Services permissible exposure limit for benzene levels in the workplace.

(3) Concentrations of chemicals associated with vehicle exhaust including carbon monoxide (CO), nitrogen dioxide ($NO_2$) and total hydrocarbons (THC) were generally low in the Whitemud Drive survey area. The maximum one-hour CO concentration was 2.7 ppm compared to the one-hour guideline of 13 ppm. The maximum $NO_2$ concentration was 0.041 ppm compared to the one-hour guideline of 0.212 ppm. The highest THC concentration was 4.4 ppm. Alberta does not have a one-hour guideline for THC, however levels above 10 ppm usually warrant further investigation. Maximum CO, $NO_2$ and THC levels at permanent monitoring stations in Edmonton for the same monitoring period were 9.3 ppm for CO (at the Edmonton Northwest station), 0.073 ppm for $NO_2$ (at the Edmonton Northwest station) and 10.0 ppm for THC (at the Edmonton East station). Maximum levels measured for these pollutants in the Whitemud Drive area survey were considerably lower. Vehicles are the major source of CO, $NO_2$ and THC. However, industry is a major source of THC in east Edmonton.

(4) High levels of large particulates were measured on several occasions during the Whitemud Drive area survey. These levels are indicative of traffic on or near Whitemud Drive. The maximum one-hour total suspended particulate (TSP) concentration was 459 $\mu g/m^3$. Maximum TSP levels from other mobile monitoring surveys conducted in Alberta range from 52 to over 2000 $\mu g/m^3$. Higher levels are usually measured adjacent to gravel roads with significant traffic. TSP consists of large particles that are important primarily from a nuisance perspective.

(5) Levels of small, respirable particulates ($PM_{2.5}$) were low near Whitemud Drive. $PM_{2.5}$ refers to particles that are small enough to be deposited into the lungs and can be a human health concern depending on their concentration and composition. The maximum one-hour $PM_{2.5}$ concentration measured during the survey was 37 $\mu g/m^3$. This maximum value is much lower than the one-hour equivalent concentration for the Canada-wide Standard in Alberta of 80 $\mu g/m^3$.

## Part 1: Monitoring Using the Mobile Air Monitoring Laboratory

### Monitoring Method

Alberta Environment used the Mobile Air Monitoring Laboratory (MAML) to monitor air quality in the Whitemud Drive area from June 21, 2000 to June 14, 2001. A total of 191 hours of data were collected on 16 days representing each season on the dates indicated below.

- June 21 and 22, 2000; June 13 and 14, 2001 (summer seasonal survey).
- October 26 and 30, 2000; November 14 and 30, 2000 (fall seasonal survey).
- January 10, 2001; February 13, 16, 27, 2001 (winter seasonal survey).
- April 18, 19, 2001; May 3 and 24, 2001 (spring seasonal survey).

Six locations were monitored during the survey. Sites and alternate sites were selected so that monitoring would always be conducted downwind of Whitemud Drive. The choice of the site to be monitored was based on the wind conditions at the time of monitoring. For example, Site #1 (Brookside - located on the east side of freeway) would be monitored if the winds were primarily from the west and Site #1a (Ramsay Heights - located on the west side of the Freeway) would be monitored if the winds were from primarily from the east. Sites #1 to #5 (a and b) were located adjacent to the freeway while Site #6 (a and b) were located further downwind from the freeway.

Each monitoring site was visited twice per survey day so that pollutant levels during the morning and afternoon traffic rush hours would be represented. Also, each location was monitored for a minimum of one hour to allow comparison with the Alberta Ambient Air Quality Guidelines. The monitoring sites are indicated in Table 1.1 and Figure 1.1.

Data collected from the Whitemud Drive survey were compared with data collected at the three permanent monitoring stations operated by Alberta Environment in Edmonton. These are the Edmonton Central (10255-104 Street), Edmonton Northwest (13335-127 Street) and Edmonton East (105 Avenue and 17 Street) stations (see Figure 1.1). All times are reported as Mountain Standard Time (MST).

**Table 1.1 MAML monitoring site descriptions in the Whitemud Drive area survey.**

| Monitoring Site* | Location | # of Hours Monitored |
|---|---|---|
| Site #1 | Brookside – church parking lot at 53 Avenue and 144 Street (next to freeway on east side). | 16 |
| Site #1a | Ramsay Heights – 147 Street and 48 Avenue (next to freeway on west side). | 1 |
| Site #1b | Brander Gardens Park - northeast end of Riverbend Road - 145 Steet and Riverbend Road. | 13 |
| Site #2 | John Janzen Nature Centre parking lot - (next to freeway in the river valley). | 23 |
| Site #2a | 200m off Fox drive (on approach road to Fort Edmonton). | 9 |
| Site #3 | Lynnwood – 152 Street and 79A Avenue (next to freeway on north side). | 21 |
| Site #3a | Rio Terrace – 154 Street and 78 Avenue (next to freeway on south side). | 11 |
| Site #4 | Elmwood – 167 Street and 79A Avenue (1 block north of freeway). | 20 |
| Site #4a | Patricia Heights – 165 Street and 78 Avenue (next to freeway on south side). | 12 |
| Site #5 | Aldergrove – 184 Street and 80 Avenue (next to freeway on north side). | 19 |
| Site #5a | Lymburn - 78 Avenue 184 Street. | 12 |
| | **Furthur Downwind Sites** | |
| Site #6 | Rio Terrace – community league building at 155 Street and 76 Avenue (3 blocks south of freeway). | 2 |
| Site #6a | Quesnell Heights – Quesnell Crescent at 148 Street (2 blocks south of freeway). | 19 |
| Site #6b | Laurier Heights – 82 Avenue and 145 Street (4 blocks north of freeway). | 13 |

* - a or b after the site number indicates alternate location for downwind positioning.

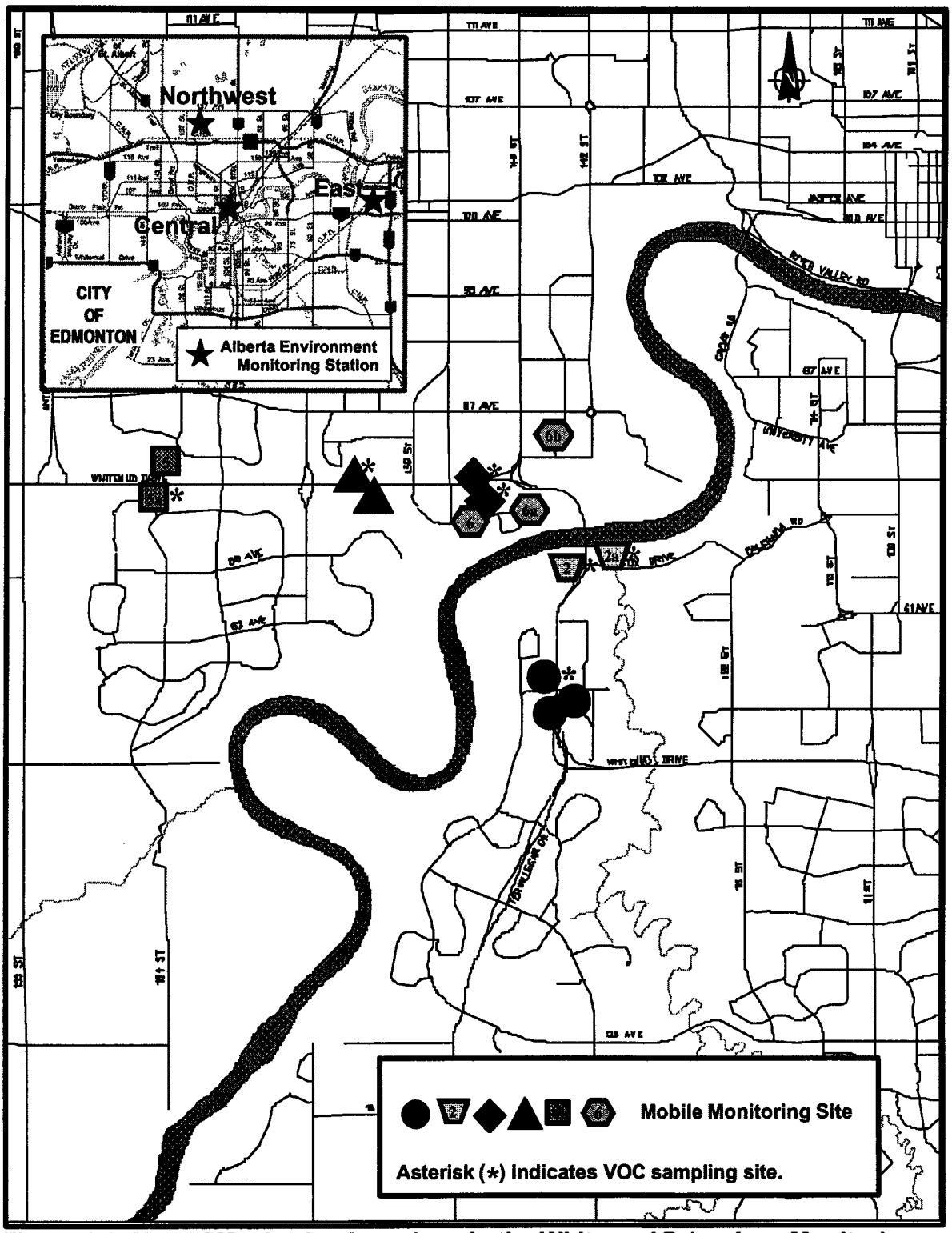


**Figure 1.1 Map of Monitoring Locations in the Whitemud Drive Area Monitoring Survey.**

## The Mobile Air Monitoring Laboratory

The MAML is a 27-foot (8.2 m) vehicle that has been specially designed and equipped to measure air quality. It houses a variety of instruments that continuously sample the air at specified time or distance intervals. The MAML is equipped with:

- A dual computer system custom-programmed to accept and record the measurement of air samples from each analyzer.
- A GPS (Global Positioning System) that identifies the MAML's location as it moves around Alberta.
- An exhaust purifying system that minimizes emissions from the vehicle.
- Two on-board generators that are also equipped with exhaust scrubbers.

The parameters measured by the MAML during the Whitemud Drive area survey are indicated in Table 1.2. Tables A1 to A6 in the Appendix (pages 25 and 26), contain median and maximum air pollutant levels at all sites monitored during the survey and at permanent stations in Edmonton and Calgary. Hourly air pollutant concentrations, weather conditions and the MAML operator's comments for each location monitored are indicated in Tables A7 to A14 in the Appendix (pages 27 to 34).

**Figure 1.2 Alberta Environment's Mobile Air Monitoring Laboratory (MAML).**

**Table 1.2 Parameters monitored by the MAML (also includes minimum detection limits and operating ranges).**

| Parameter Measured | Minimum Detectable Limit* | Operating Range** |
|---|---|---|
| sulphur dioxide ($SO_2$) | 0.6 ppb | 1 ppm |
| hydrogen sulphide ($H_2S$) | 0.6 ppb | 1 ppm |
| total reduced sulphur (TRS) | 0.6 ppb | 1 ppm |
| total hydrocarbons (THC) | 0.005 ppm | 20 ppm |
| reactive hydrocarbons (RHC) | 0.005 ppm | 20 ppm |
| methane ($CH_4$) | 0.005 ppm | 10 ppm |
| polycyclic aromatic hydrocarbons (PAHs) | 3 ng/m$^3$ | 1000 ng/m$^3$ |
| ozone ($O_3$) | 0.001 ppm | 0.5 ppm |
| nitrogen dioxide ($NO_2$) | 1.0 ppb | 1 ppm |
| nitric oxide (NO) | 1.0 ppb | 1 ppm |
| total oxides of nitrogen ($NO_x$) | 1.0 ppb | 1 ppm |
| total suspended particulates (TSP) | 1 µg/m$^3$ | 1.0 g/m$^3$ |
| inhalable particulates ($PM_{10}$) | 1 µg/m$^3$ | 1.0 g/m$^3$ |
| respirable particulates ($PM_{2.5}$) | 1 µg/m$^3$ | 1.0 g/m$^3$ |
| carbon monoxide (CO) | 0.1 ppm | 50 ppm |
| ammonia ($NH_3$) | 1.0 ppb | 5 ppm |
| wind direction (WDR) | 0 degrees | 360 degrees |
| wind speed (WSP) | 0 kph | 200 kph |
| temperature (Temp) | -40 °C | 50 °C |
| relative humidity (RH) | 0 % | 100 % |

ppb = parts per billion; ppm = parts per million; ng/m$^3$ = nanograms per cubic metre
µg/m$^3$ = micrograms per cubic metre; g/m$^3$ = grams per cubic metre; kph = kilometres per hour
°C = degrees Celsius; % = per cent

* The ***minimum detectable limit*** indicates the *minimum* amount of pollutant the instrument can measure.

** The ***operating range*** indicates the *maximum* amount of pollutant the instrument can detect. This limit is set to provide the optimum precision over that range. The upper limit can be raised, however, precision at the lower levels (where most levels are monitored) is then compromised.

## Alberta's Ambient Air Quality Guidelines

Alberta's Ambient Air Quality Guidelines[1] are established under Section 14 of the Environmental Protection and Enhancement Act (EPEA). EPEA provides for the development of guidelines and ambient environmental quality objectives for all or part of Alberta.

The Ambient Air Quality Guidelines are used for:

- Reporting on the state of the atmospheric environment in Alberta.
- Reporting to Albertans on the quality of air through an air quality index.
- Establishing approval conditions for regulated industrial facilities.
- Evaluating proposals to construct facilities that will have air emissions.
- Guiding special ambient air quality surveys.
- Assessing compliance near major industrial air emission sources.

Alberta's Ambient Air Quality Guidelines for one-hour concentrations of parameters monitored by the MAML are indicated in Table 1.3.

[1] *Alberta Ambient Air Quality Guidelines.* Alberta Environment. February 2000.

**Table 1.3 Alberta's Ambient Air Quality Guidelines for parameters measured by the MAML.**

| Air Quality Parameter | One-hour Guideline (ppm*) | Basis for Guideline |
|---|---|---|
| hydrogen sulphide | 0.01 | odour perception |
| ammonia | 2 | odour perception |
| carbon monoxide | 13 | oxygen carrying capacity of blood |
| nitrogen dioxide | 0.212 | odour perception |
| ozone | 0.082 | reduction of lung function and effects on tomatoes |
| sulphur dioxide | 0.172 | taste, odour perception and effects on bluegrass |

* Parts per million by volume.

## Carbon Monoxide (CO)

| max. one-hour concentration recorded during survey | one-hour guideline |
|---|---|
| 2.7 ppm | 13.0 ppm (based on the oxygen-carrying capacity of blood) |

*Carbon monoxide (CO) is a colourless, odourless gas emitted into the atmosphere primarily by motor vehicles. Minor sources include fireplaces, industry, aircraft and natural gas combustion. The major source of carbon monoxide is vehicle exhaust emissions.*

CO values were well below the one-hour ambient air quality guideline of 13.0 ppm at all monitoring sites during the Whitemud Drive survey. The maximum concentration of 2.7 ppm is 21 per cent of one-hour guideline. This value was measured at Site #4 (Elmwood) from 6:54 p.m. to 7:57 p.m. on January 10, 2001. The next highest CO reading (2.2 ppm) was measured during the previous hour (5:41 p.m. to 6:40 p.m.) at the Site #6 (Rio Terrace) on January 10, 2001.

Average CO concentrations were consistent between all monitoring sites. The median CO concentration ranged from 0.3 to 0.4 ppm based on all data collected at the six monitoring sites.

The overall median and maximum CO concentrations during the Whitemud Drive survey were 0.4 and 2.7 ppm, respectively. These values are lower than or close to the same as concentrations measured at permanent monitoring stations in Edmonton over the same time period. The median concentrations at the Edmonton Central, Northwest and East monitoring stations for the same time period were 0.7, 0.6 and 0.3 ppm, respectively. The maximum one-hour CO concentrations at these three stations were 4.8, 9.3 and 2.8 ppm, respectively. The major source of CO at urban locations is vehicle exhaust emissions.

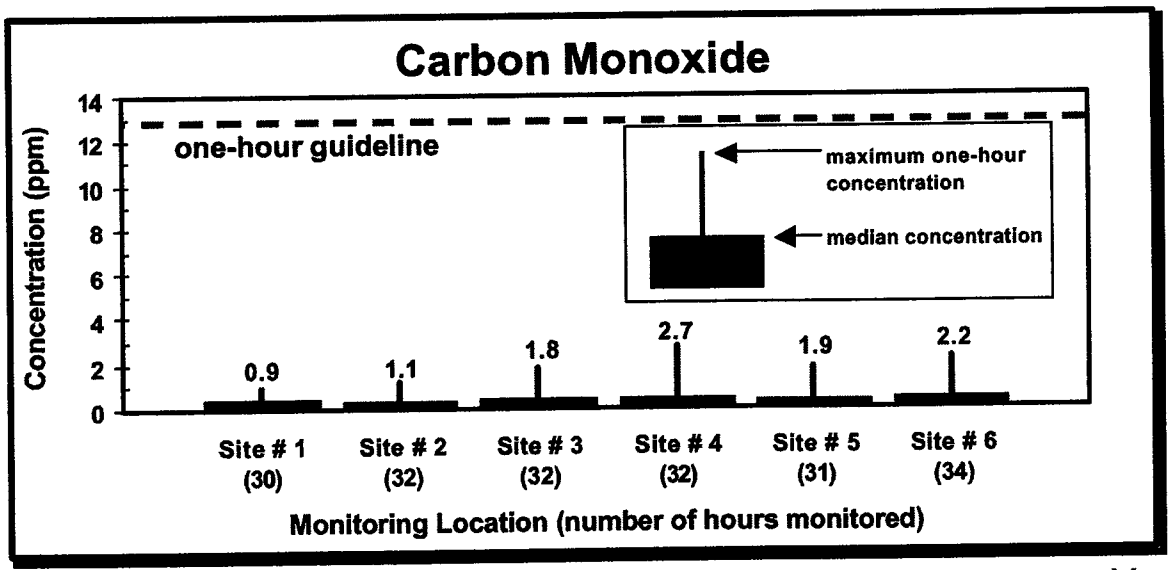


**Figure 1.3 One-hour median and maximum concentrations for carbon monoxide.**

## Oxides of Nitrogen ($NO_2$, NO and $NO_x$)

| max. one-hour concentration recorded during survey | one-hour guideline |
|---|---|
| $NO_2$ = 0.041 ppm | 0.212 ppm (based on odour perception) |
| NO = 0.230 ppm | no guideline |
| $NO_x$ = 0.262 ppm | no guideline |

*Oxides of nitrogen ($NO_x$) are the total of nitrogen dioxide ($NO_2$) and nitric oxide (NO). During high temperature combustion - as in the burning of natural gas, coal, oil and gasoline - atmospheric nitrogen may combine with molecular oxygen to form NO. NO is colourless and odourless. Most NO in the ambient air is oxidized to form $NO_2$. $NO_2$ is a reddish-brown gas with a pungent odour. The major source of oxides of nitrogen in urban areas is vehicle exhaust emissions.*

$NO_2$ levels were below Alberta's one-hour guideline at all monitoring locations during the Whitemud Drive area survey. The maximum $NO_2$ concentration of 0.041 ppm was recorded at Site #3a (Rio Terrace adjacent to Whitemud Drive) on November 14, 2000 (4:23 p.m. to 5:29 p.m.) and at Site #3 (Lynwood) on February 27, 2001 (6:15 p.m. to 7:16 p.m.). This maximum concentration is 19 per cent of the one-hour guideline.

Median $NO_2$ concentrations ranged from 0.009 ppm at Site #5 (Aldergrove and Lymburn) to 0.019 ppm at Site #3 (Lynwood and Rio Terrace). The overall median $NO_2$ concentration at all sites was 0.014 ppm. This value is similar to median values measured at the Edmonton Northwest (0.016 ppm) and Edmonton East (0.013 ppm) stations over the same time period. The median $NO_2$ concentration at the Edmonton Central station was much higher with a value of 0.023 ppm.

The maximum one-hour $NO_2$ concentration measured in the Whitemud Drive area survey (0.041 ppm) was lower then maximum values measured at the Edmonton Central (0.057 ppm), Edmonton Northwest (0.073 ppm) and Edmonton East (0.050 ppm) monitoring stations.

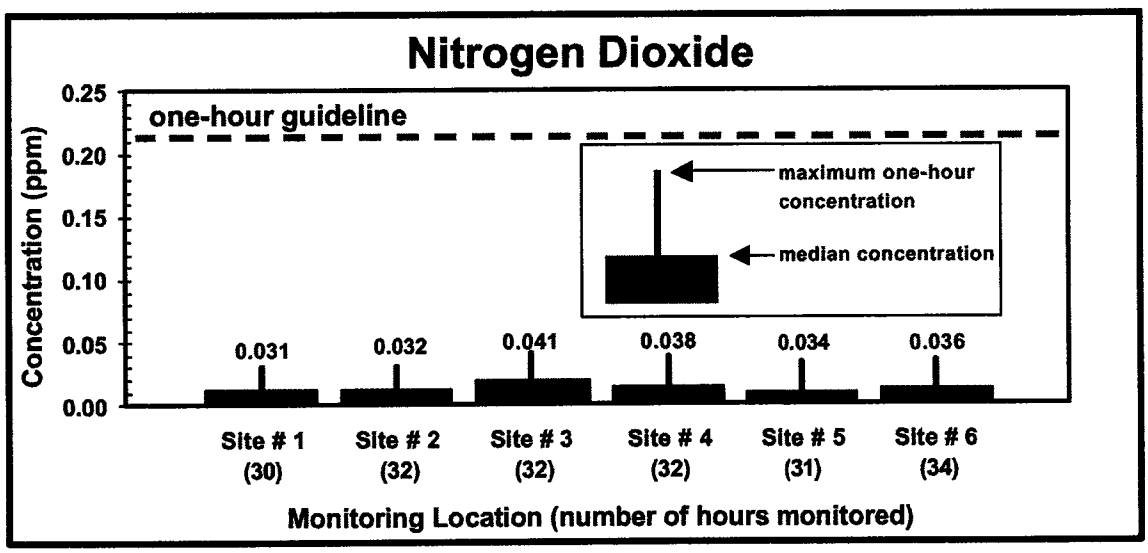


**Figure 1.4 One-hour median and maximum concentrations for nitrogen dioxide.**

**Hydrocarbons (THC, RHC and $CH_4$)**

| max. one-hour concentration recorded during survey | one-hour guideline |
|---|---|
| THC = 4.4 ppm | no guideline |
| RHC = 1.6 ppm | no guideline |
| $CH_4$ = 2.7 ppm | no guideline |

*The term "total hydrocarbons" (THC) refers to a broad family of chemicals that contain carbon and hydrogen atoms. Methane ($CH_4$) is the most common natural hydrocarbon in the earth's atmosphere. Specific reactive hydrocarbons (RHC) are important because they can contribute to summertime smog or be toxic at high concentrations. Some sources of hydrocarbons include vegetation, vehicle emissions, oil and gas processing, chemical processing, dry cleaning, fireplaces, natural gas combustion, aircraft traffic and evaporation of solvents. Normal background THC concentrations recorded in rural Alberta range from 1.5 to 2.0 ppm. Background hydrocarbons are primarily composed of $CH_4$ with a small contribution from RHC (about 0.2 ppm).*

The maximum one-hour THC concentration (4.4 ppm) was measured at Site #4 (Elmwood) on Jan 10, 2001 from 6:54 p.m. to 7:57 p.m. Maximum one-hour THC concentrations were less than 4 ppm at the other monitoring sites. Maximum one-hour THC concentrations at the Edmonton Central, Northwest and East monitoring stations over the same monitoring period were 2.6, 6.0 and 10.0 ppm, respectively. Because of the complex nature of individual hydrocarbons species, there are not ambient guidelines for THC.

Median THC concentrations were consistent between all Whitemud Drive area monitoring sites ranging from 2.1 to 2.2 ppm. This is close to the median concentration measured at the three permanent monitoring stations in Edmonton (2.2 ppm). A more detailed discussion of hydrocarbons measured near Whitemud Drive is presented in Part 2 of this report.

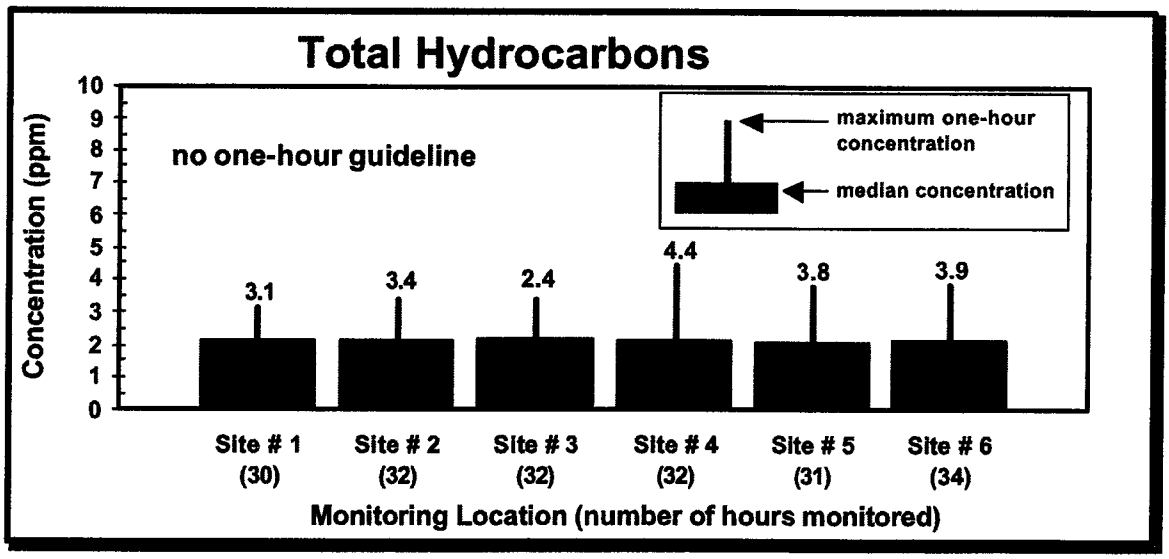


**Figure 1.5 One-hour median and maximum concentrations for total hydrocarbons.**

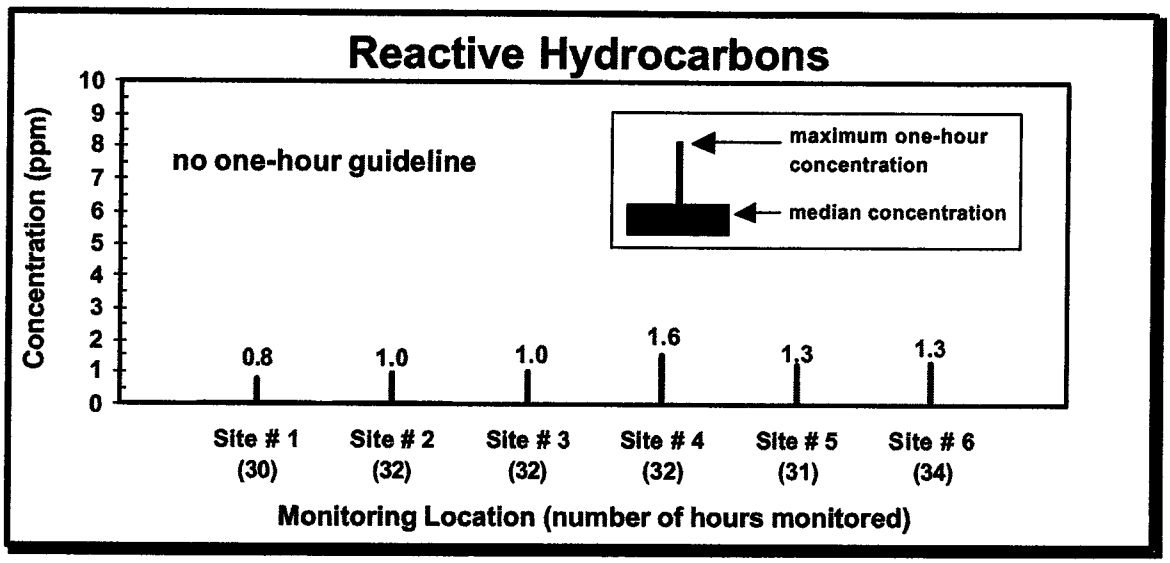


**Figure 1.6** One-hour median and maximum concentrations for reactive hydrocarbons.

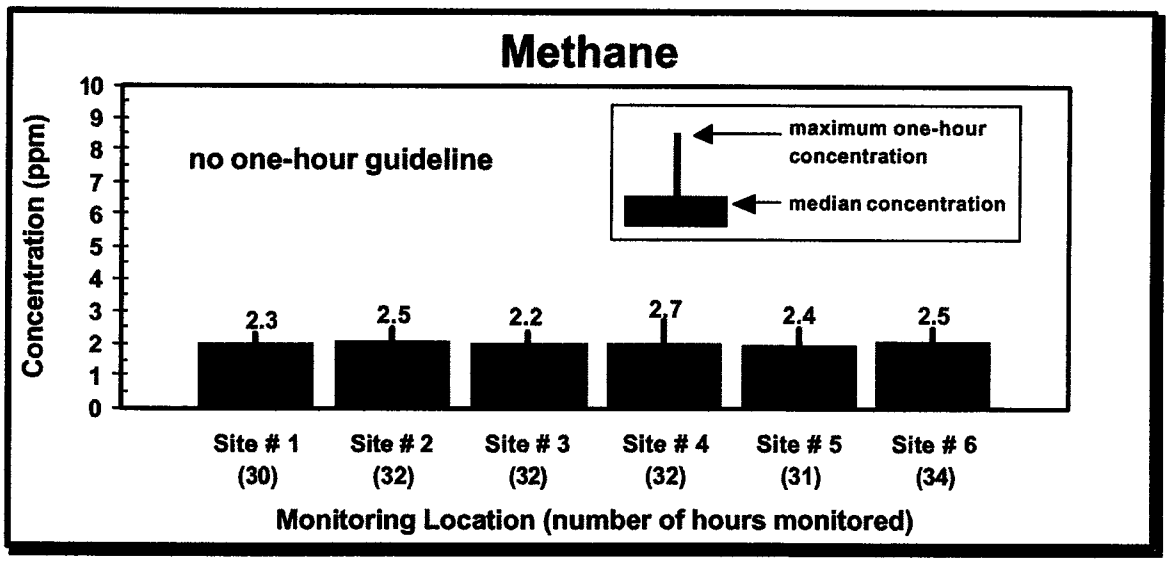


**Figure 1.7** One-hour median and maximum concentrations for methane.

**Particulates (TSP, $PM_{10}$ and $PM_{2.5}$)**

| maximum one-hour concentration recorded during survey | one-hour guideline |
|---|---|
| TSP = 459 µg/m$^3$ | no guideline |
| $PM_{10}$ = 239 µg/m$^3$ | no guideline |
| $PM_{2.5}$ = 37 µg/m$^3$ | no guideline |

*Total suspended particulates (TSP) refer to all particles up to 500 microns in diameter (a human hair is about 70 microns in diameter) and are important primarily from a nuisance perspective. Particles less than 10 micrometres in diameter ($PM_{10}$) can be inhaled into the nose and throat while smaller particles, less than 2.5 micrometres in diameter ($PM_{2.5}$), can penetrate into the lungs. Sources of particulates include soil dust, road dust, agricultural dust (e.g., harvest), smoke from forest fires and recreational wood burning, vehicle exhaust emissions, brake and tire wear, and industrial emissions. Smaller particles ($PM_{2.5}$) originate in the atmosphere because of condensation and combustion from sources such as vehicle exhaust emissions, industrial emissions and wood burning.*

The highest TSP and $PM_{10}$ levels were measured at Site #3 (Lynwood) from 5:23 p.m. to 6:22 p.m. on October 26, 2000. High large particulate levels at this site were likely caused by traffic from Whitemud Drive. Maximum TSP concentrations during other mobile monitoring surveys in the province ranged from 52 µg/m$^3$ (Caroline/Sundre area) to over 2000 µg/m$^3$ (Bow Corridor and County of Grande Prairie). Elevated large particulate levels at rural locations are usually caused by road dust from unpaved roads.

The highest concentration of fine particulates ($PM_{2.5}$) was measured at Site #5a (Lymburn) on May 24, 2001 (11:42 a.m. to 12:42 p.m.) with a value of 37 µg/m$^3$. The MAML operator noted smoky conditions (from the Chisholm fire, 150 km north-northwest of Edmonton) at most monitoring locations on May 24. Maximum one-hour $PM_{2.5}$ concentrations were higher than 250 µg/m$^3$ at permanent Edmonton monitoring stations on May 24. The forest fire smoke situation on May 24 prompted Capital Health to issue an air quality advisory for the Edmonton area.

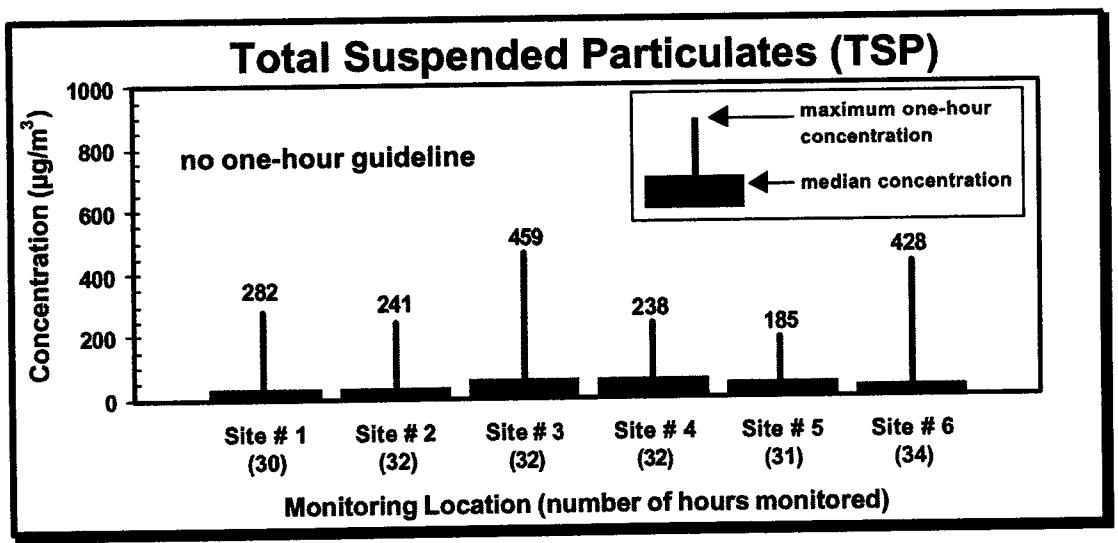


**Figure 1.8 One-hour median and maximum concentrations for total suspended particulates (TSP).**

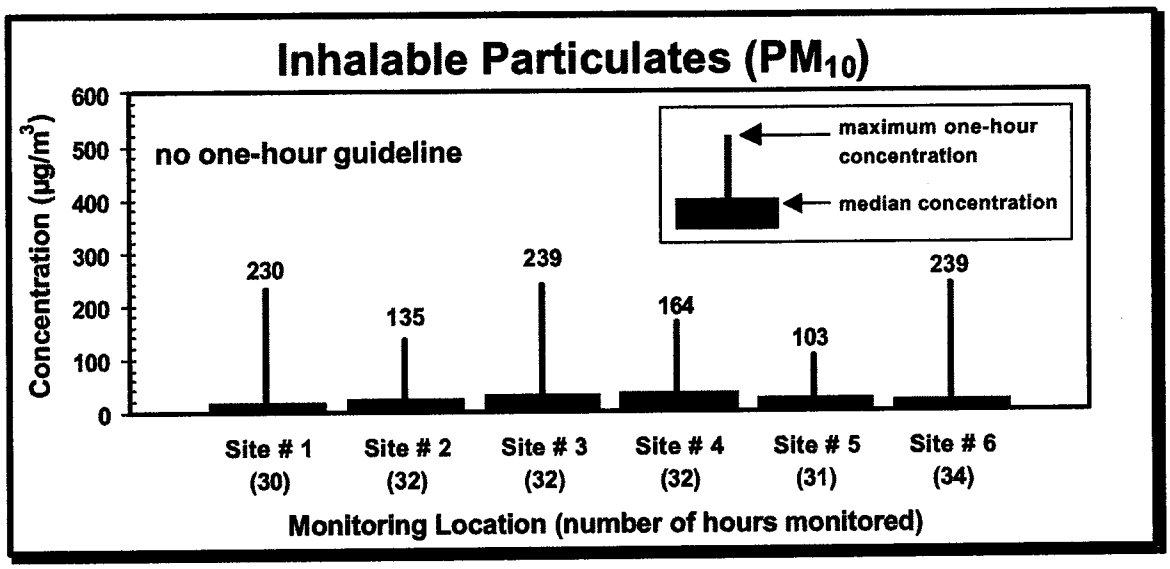


**Figure 1.9** One-hour median and maximum concentrations for inhalable particulates ($PM_{10}$).

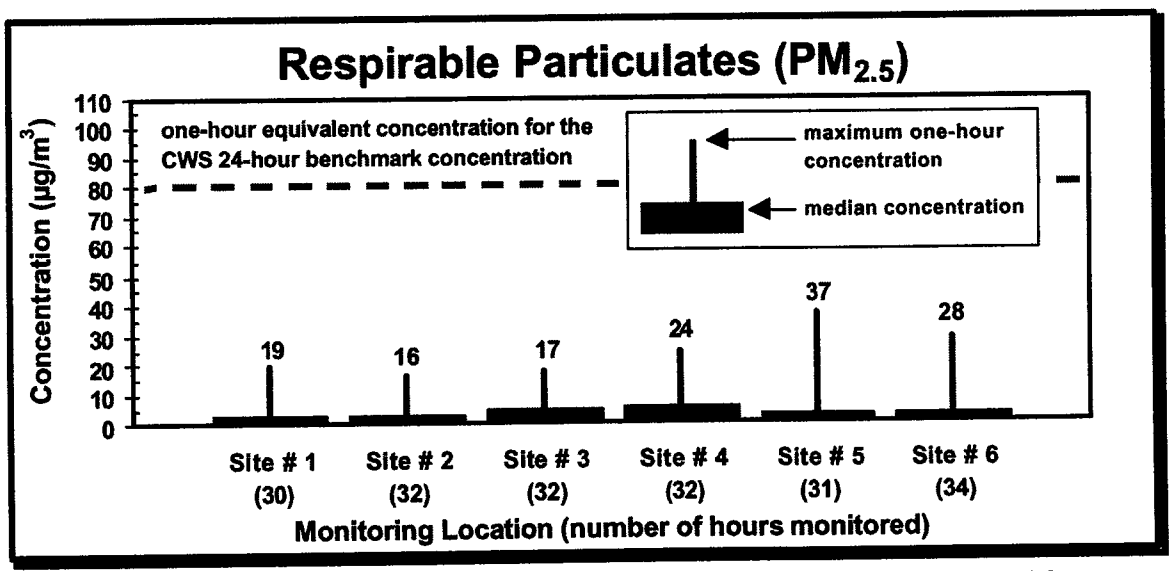


**Figure 1.10** One-hour median and maximum concentrations for respirable particulates ($PM_{2.5}$).

## Ozone ($O_3$)

| maximum one-hour concentration recorded during survey | one-hour guideline |
|---|---|
| 0.059 ppm | 0.082 ppm (based on reduction of lung function and effects on tomatoes) |

*Ozone in the lower atmosphere is produced by the reaction of oxides of nitrogen and volatile organic compounds in the presence of sunlight, and transport of $O_3$ from the upper atmosphere to ground level. Transport from the upper atmosphere is likely the dominant ozone producing process in the fall, winter and early spring seasons. $O_3$ concentrations are generally lower in urban centres due to the destruction of $O_3$ by nitric oxide.*

$O_3$ levels followed the typical daily and seasonal variations that are observed at other urban monitoring locations in Alberta. The highest concentration was measured at Site #5a (Lymburn) on May 24, 2001 (11:42 a.m. to 12:42 p.m.). The $O_3$ concentration measured at this time (0.059 ppm) was 72 per cent of the one-hour guideline of 0.082 ppm. The forest fire smoke transported into Edmonton from the Chisholm fire may have influenced $O_3$ levels on May 24. Maximum one-hour $O_3$ concentrations for the same time period at the Edmonton Central, Northwest and East stations were 0.047, 0.057 and 0.061 ppm, respectively.

Median $O_3$ concentrations in the Whitemud Drive area ranged from 0.016 ppm at Site #3 (Lynwood and Rio Terrace) to 0.025 ppm at Site #5 (Aldergrove and Lymburn). The median $O_3$ concentration for the entire Whitemud Drive survey was 0.019 ppm. Median $O_3$ levels at permanent Edmonton monitoring stations for the same time period ranged from 0.017 ppm (Edmonton Central) to 0.026 ppm (Edmonton East).

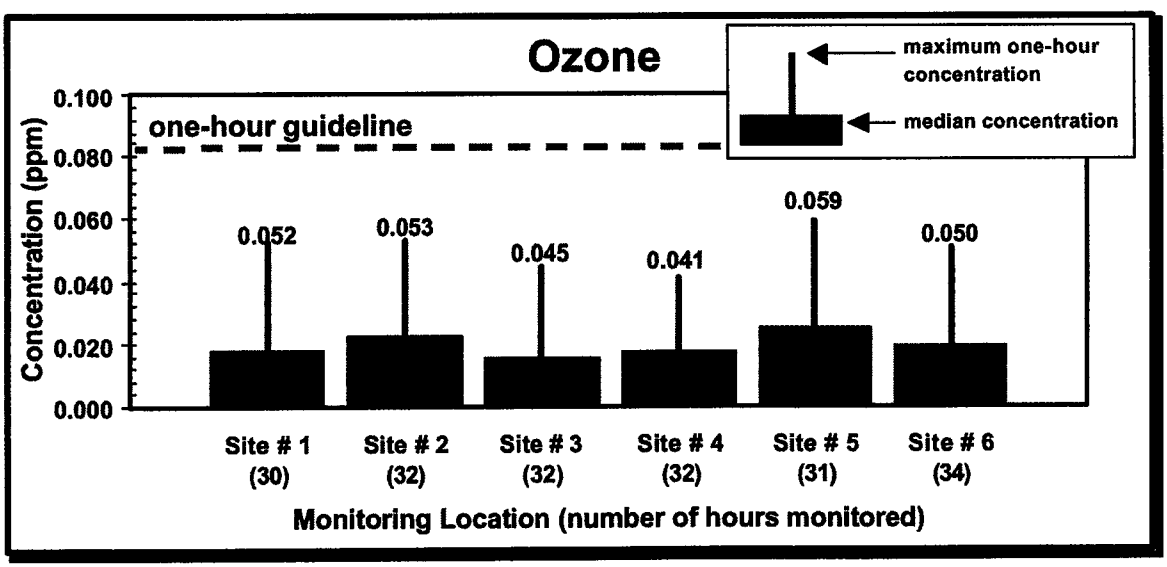


**Figure 1.11 One-hour median and maximum concentrations for ozone.**

## Polycyclic Aromatic Hydrocarbons (PAHs)

| maximum one-hour concentration recorded during survey | one-hour guideline |
|---|---|
| 77 ng/m$^3$ | no guideline |

*Polycyclic aromatic hydrocarbons (PAHs) are a class of chemicals that are usually contained in soot and smoke. There are more than 100 different PAHs with varying levels of toxicity. They are formed during the incomplete combustion of gasoline, diesel, oil, coal, wood, garbage or other organic substances. Tobacco smoke and charbroiled meats are common sources of PAHs. Other outdoor PAH sources include vehicle exhaust emissions, wood smoke from fireplaces, smoke from forest fires and industrial facilities. PAHs occur in the atmosphere in the vapour phase or attached to dust particles. The PAH monitoring instrument aboard the MAML will analyze only particulate bound PAHs.*

The highest one-hour PAH concentration was recorded at Site #3a (Rio Terrace) from 4:23 p.m. to 5:29 p.m. on November 14, 2000 (77 ng/m$^3$ or nanograms per cubic metre). Maximum one-hour PAH concentrations from other mobile monitoring surveys ranged from 11 ng/m$^3$ in the Lethbridge area (Picture Butte/Sterling) survey to 113 ng/m$^3$ in the Whitecourt area survey. There are no one-hour guidelines for total PAHs in Alberta or in other jurisdictions in North America.

The overall median PAH concentration at all sites in the Whitemud Drive area survey was 8 ng/m$^3$. Median PAH concentrations during other mobile surveys in Alberta ranged from 1 to 5 ng/m$^3$. Higher PAH levels measured during the Whitemud Drive area survey were likely due to exhaust emissions from local traffic and traffic on Whitemud Drive. PAHs are not monitored as a one-hour concentration at permanent monitoring stations in Edmonton. Therefore, PAH levels measured in the Whitemud Drive area survey cannot be compared to other parts of the city.

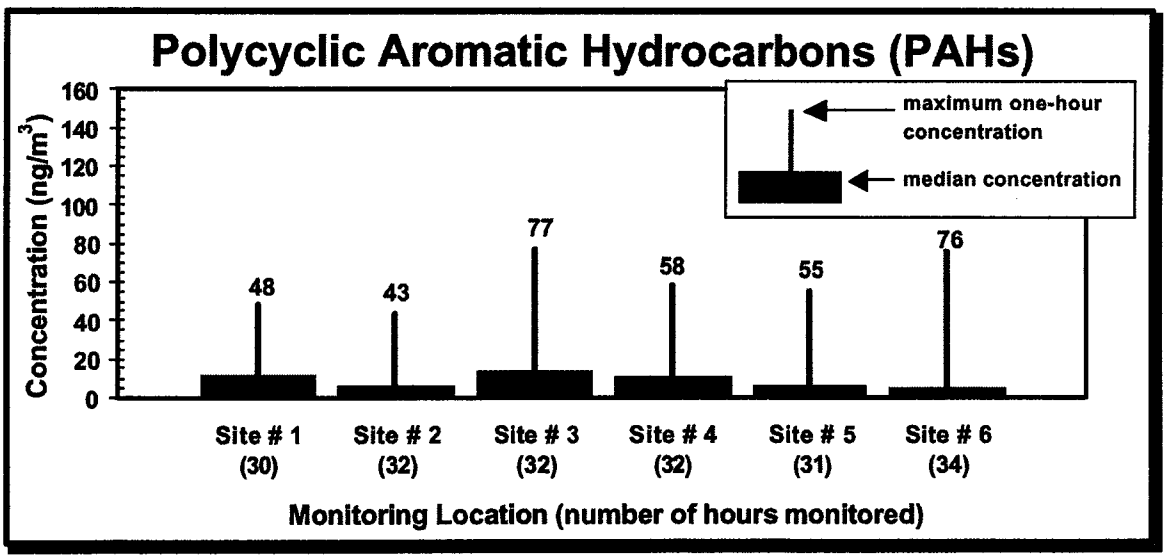


**Figure 1.12 One-hour median and maximum concentrations for polycyclic aromatic hydrocarbons.**

## Sulphur Dioxide ($SO_2$)

| maximum one-hour concentration recorded during survey | one-hour guideline |
|---|---|
| 0.015 ppm | 0.172 ppm (based on taste, odour perception and effects on bluegrass) |

*Sulphur dioxide ($SO_2$) is a colourless gas with a pungent odour. In Alberta, it is estimated that 45 per cent of $SO_2$ emissions are produced by natural gas processing plants while oil sands and power plants produce about 26 per cent and 21 per cent of $SO_2$ emissions, respectively[2]. Other sources include gas plant flares, oil refineries, pulp and paper mills and fertilizer plants.*

$SO_2$ levels were below Alberta's one-hour guideline at all sites monitored during the Whitemud Drive area survey. The maximum one-hour concentration of 0.015 ppm was measured at Site # 6b (Laurier Heights) from 12:25 p.m. to 1:25 p.m. on February 27, 2001. This value is 9% of the one-hour guideline for $SO_2$. Maximum $SO_2$ levels at the remaining monitoring sites were 0.012 ppm or lower. The maximum one-hour $SO_2$ concentration at the Edmonton East station for the same time period was 0.011 ppm.

The overall median $SO_2$ concentration measured during the entire Whitemud Drive area survey was 0.002 ppm. The median concentration at the Edmonton East station was also 0.002 ppm for the same time period. $SO_2$ is not routinely monitored at other permanent monitoring stations in Edmonton.

[2] Environment Canada. 1998. *1995 Criteria Air Contaminant Emissions Inventory Summaries.* Pollution Data Branch, Environment Canada.

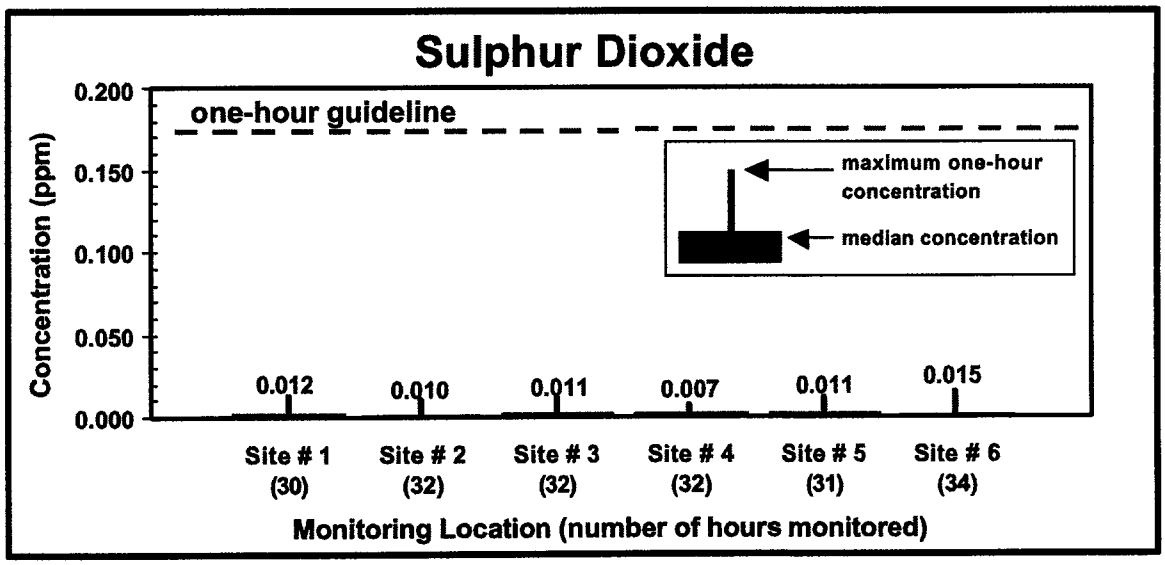


**Figure 1.13 One-hour median and maximum concentrations for sulphur dioxide.**

## Hydrogen Sulphide and Total Reduced Sulphur ($H_2S$ and TRS)

| maximum one-hour concentration recorded during survey | one-hour guideline |
|---|---|
| $H_2S$ = 0.003 ppm | 0.010 ppm (based on odour perception) |
| TRS = 0.005 ppm | no guideline |

*Hydrogen sulphide ($H_2S$) is a colourless gas with a rotten egg odour. Total reduced sulphur (TRS) includes hydrogen sulphide, mercaptans, dimethyl sulphide, dimethyl disulphide and other sulphur compounds. Sulphur dioxide is not included in the determination of TRS. Industrial sources of $H_2S$ and TRS include fugitive emissions (leakages) from petroleum refineries, tank farms for unrefined petroleum products, natural gas plants, petrochemical plants, oil sands plants, sewage treatment facilities, pulp and paper plants that use the Kraft pulping process, and animal feedlots. Natural sources of $H_2S$ include sulphur hot springs, sloughs, swamps and lakes.*

$H_2S$ concentrations were below Alberta's one-hour air quality guideline at all locations monitored during the survey. The maximum one-hour $H_2S$ (0.003 ppm) concentration was measured at Site #5 (Aldergrove) on January 10, 2001 from 8:07 p.m. to 9:06 p.m. This value is 30 per cent of the one-hour guideline for $H_2S$ (0.010 ppm). The maximum $H_2S$ concentration at the Edmonton East station for the same time period was 0.008 ppm. The maximum one-hour TRS concentration (0.005 ppm) was recorded at Site #5 (Aldergrove) on April 18, 2001 from 11:34 a.m. to 12:33 p.m. TRS is not routinely monitored at permanent monitoring stations in Edmonton.

The median $H_2S$ concentration at all sites monitored during the Whitemud Drive area survey was 0.000 ppm. The median at the Edmonton East monitoring station for the same time period was also 0.000 ppm.

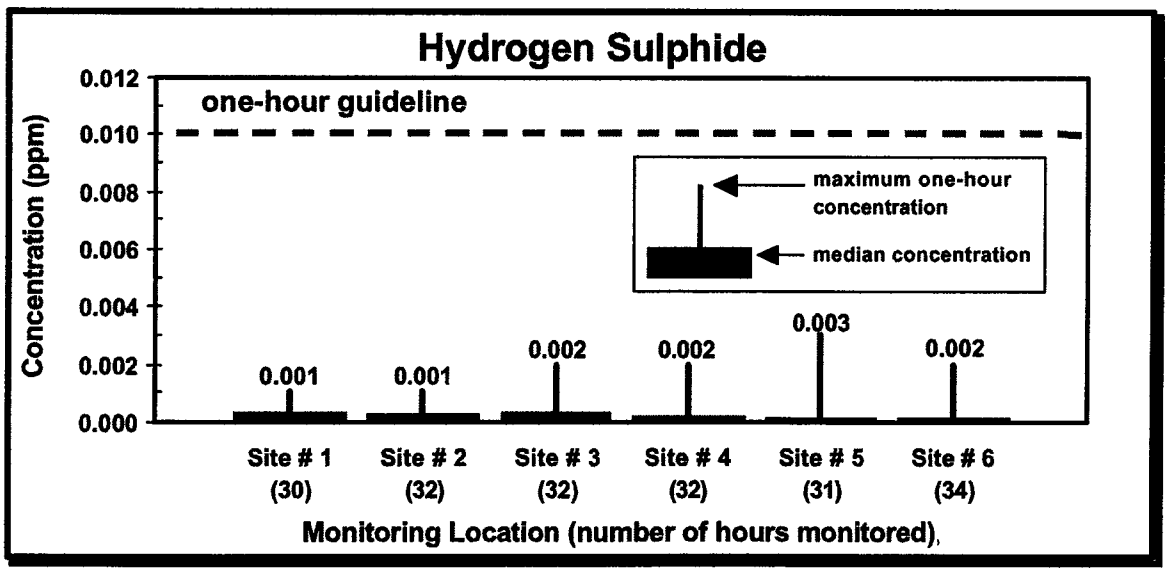


**Figure 1.14 One-hour median and maximum concentrations for hydrogen sulphide.**

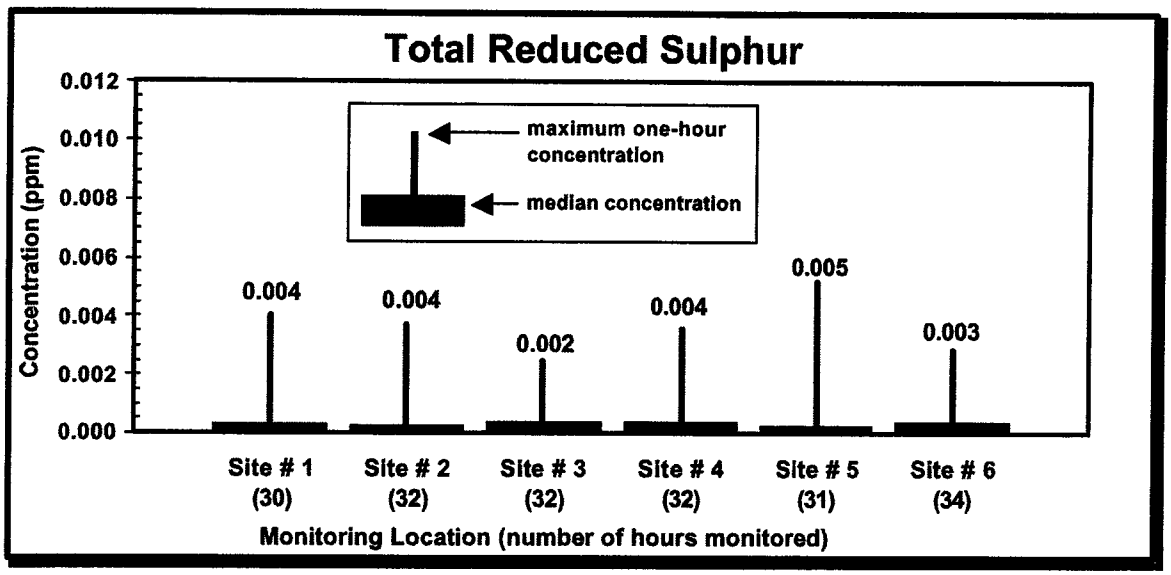


**Figure 1.15 One-hour median and maximum concentrations for total reduced sulphur.**

## Ammonia ($NH_3$)

| maximum one-hour concentration recorded during survey | one-hour guideline |
|---|---|
| 0.039 ppm | 2.0 ppm (based on odour perception) |

*Ammonia is a colourless gas with the well-known pungent odour found in household cleaners. $NH_3$ is produced both by natural and man-made sources. Some natural sources of $NH_3$ include the decay of plant material and animal waste. A small portion is also released during respiration. In Alberta, the fertilizer industry is the main industrial source of $NH_3$. The industry produces synthetic $NH_3$ for either direct application to soil as a fertilizer, or as a raw material for use in the production of other high nitrogen fertilizer products. The other major source of $NH_3$ is commercial feedlots, specifically from their large amounts of animal waste.*

$NH_3$ levels in the Whitemud Drive area survey were very low at all monitoring sites. The highest one-hour average $NH_3$ concentration detected during the survey (0.039 ppm) was measured at Site #3a (Rio Terrace) on May 24, 2001 (9:24 a.m. to 10:24 a.m.). This value is less than 2 per cent of the one-hour guideline for $NH_3$. The next highest one-hour average $NH_3$ concentration (0.024 ppm) was also detected on May 24, 2001 (11:42 a.m. to 12:42 p.m.) at Site #5a (Lymburn). Maximum one-hour $NH_3$ levels during other mobile monitoring surveys in the province ranged from 0.013 ppm (Whitecourt-Swan Hills area) to 1.364 ppm (north of Lethbridge). $NH_3$ levels on May 24, 2001 may have been influenced by smoke from the Chisholm forest fire.

Median ammonia levels at all sites ranged from 0.001 to 0.003 ppm. The overall median $NH_3$ level for the entire survey was 0.003 ppm. Median ammonia concentrations

at other mobile air quality surveys conducted in Alberta ranged from 0.003 ppm (Medicine Hat) to 0.075 ppm (north of Lethbridge). Alberta Environment does not continuously monitor $NH_3$ in Edmonton.

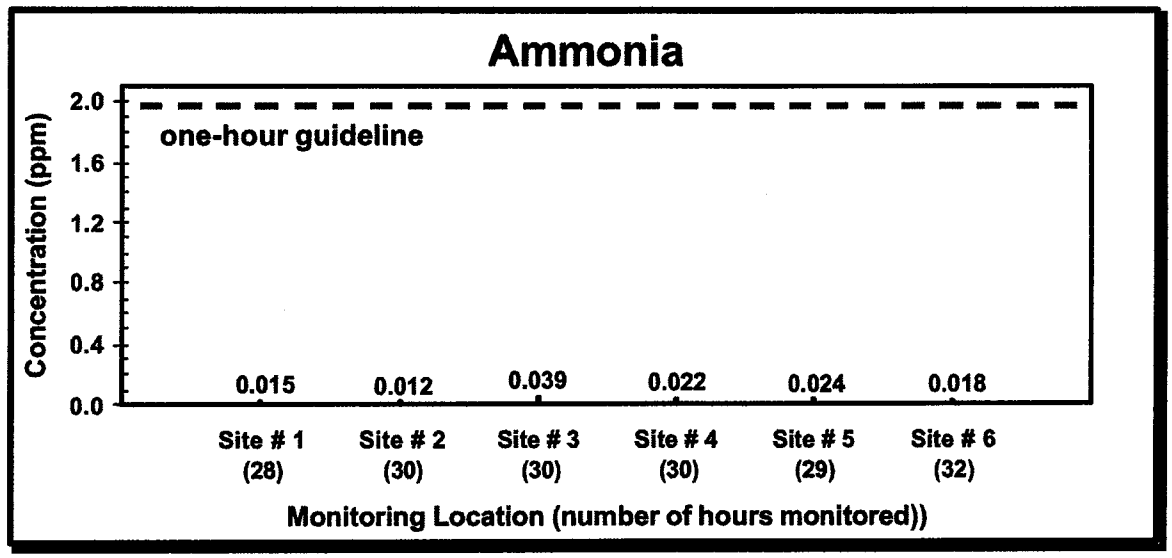


**Figure 1.16 One-hour median and maximum concentrations for ammonia.**

## Part 2: Monitoring for Volatile Organic Compounds

Volatile organic compounds (VOCs) include a large group of chemicals containing carbon and hydrogen atoms that can react quickly to form other chemicals in the atmosphere. They are important because they can present a health risk to humans, animals and vegetation. VOCs can also react with oxides of nitrogen ($NO_x$) to form ozone ($O_3$), a health hazard and major contributor to smog.

Major sources of VOCs in the outdoor environment include automobile emissions, gasoline marketing and storage tanks, petroleum and chemical industries, and natural gas combustion. Other sources of VOCs include the evaporation of solvents as well as leaking valves, flanges, pumps and compressors at industrial facilities. VOCs are also contained in incinerator and flare stack emissions associated with the oil and gas industry. The VOCs monitored in the Whitemud Drive area survey were benzene, toluene, ethylbenzene and xylenes, often referred to as BTEX compounds.

### Benzene

Benzene is a colourless gas with a sweet odour. It is a known cancer causing substance if exposed to high concentrations for a prolonged period of time. Benzene is recognized as a chemical "concluded to be toxic" on the Environment Canada First Priority Substances List (PSL1).[3] It is ranked fifth on the U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry (ATSDR) list of hazardous substances.[4] Major sources of benzene include vehicle exhaust, automobile service stations and industrial emissions. Common indoor sources of benzene include cigarette smoke, glues, paint, furniture wax and detergents.

### Toluene

Toluene is a colourless gas with a distinctive sweet and pungent odour. It is produced during activities such as gas processing and contained in paints, paint thinners, fingernail polish, lacquers and adhesives. Vehicle exhaust is also a major source of toluene. Toluene has been recognized on the PSL1 list as a chemical "not concluded to be toxic". Toluene is ranked 62nd on the ATSDR list of hazardous substances.

### Ethylbenzene

Ethylbenzene is a colourless gas with a distinctive aromatic odour. It is used in the manufacturing of styrene, plastics, synthetic rubber and latex products. Ethylbenzene is also used as a solvent and is a component of gasoline. The toxicity of ethylbenzene is being considered on the Environment Canada Second Priority Substances List (PSL2).[3] Ethylbenzene is ranked 87th on the ATSDR list of hazardous substances.

### Xylenes

Total xylenes include m-, p- and o-xylenes. Xylenes are colourless and have a sweet odour when emitted into the atmosphere. Xylenes are used in solvents, cleaning agents, paint thinner, paints and varnishes. Gasoline and forest fires also produce xylenes. Xylenes are recognized as chemicals "not concluded to be toxic" on the PSL1 list. Xylenes are ranked 48th on the ATSDR list of hazardous substances.

[3] Environment Canada. 1995. *Report of the Ministers' Expert Advisory Panel on the second priority substances list under the Canadian Environmental Protection Act (CEPA).* PSL2 Secretariat, Environment Canada, Hull, Quebec.

[4] Agency for Toxic Substances and Disease Registry. *1999 CERCLA List of Priority Hazardous Substances.* http://www.atsdr.cdc.gov/99list.html.

## Monitoring Method

A total of 32 VOC samples were collected at seven locations during the Whitemud Drive area survey (see map on page four). The samples were collected for one-hour periods at the following monitoring sites:

Site #1b (Brander Gardens Park) – three samples;
Site #2 (John Janzen Nature Centre parking lot next to freeway) – six samples;
Site #2a (Fox Drive on approach to Fort Edmonton) – three samples;
Site #3 (Lynwood) – seven samples;
Site #3a (Rio Terrace) – five samples;
Site #4 (Elmwood) – seven samples; and
Site #5a (Lymburn) – one sample.

One-hour samples were collected so that a direct comparison could be made to Alberta's one-hour guideline for benzene and Ontario's Point of Impingement Limits and Air Quality Standards for toluene, ethylbenzene and total xylenes (see Table 2.1). Samples were usually collected during the morning or traffic rush hours.

VOC samples were collected using the Carbotrap 400 adsorbent tube method. This method uses a pump that requires only battery power and therefore is relatively inexpensive and easy to operate in the field.

The Carbotrap 400 tube consists of a glass tube 10.6 cm long with a 0.4 cm inside diameter coated internally with an adsorbent media called Carbotrap. Air is passed through this tube at a low flow rate (about 50 to 100 $cm^3$/min) for a defined period of time (e.g. one hour). The Carbotrap is specifically formulated to adsorb a number of different hydrocarbon species. Then the tube undergoes laboratory analysis by gas chromatography/mass spectroscopy to quantify ambient concentrations of the hydrocarbons of interest. This monitoring method conforms to the U.S. Environmental Protection Agency (EPA) Compendium Method TO-17.[5] Carbotrap tubes were analyzed for benzene, toluene, ethylbenzene and xylenes.

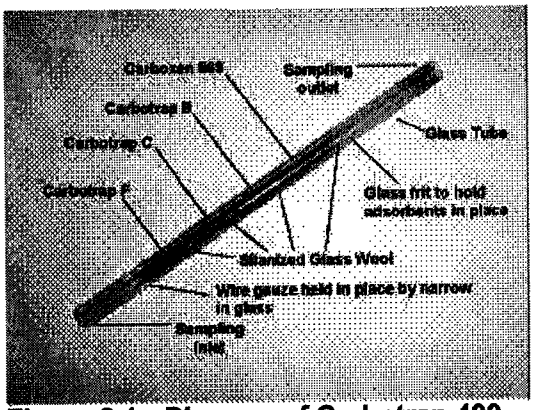


**Figure 2.1 Diagram of Carbotrap 400 adsorbent tube.**

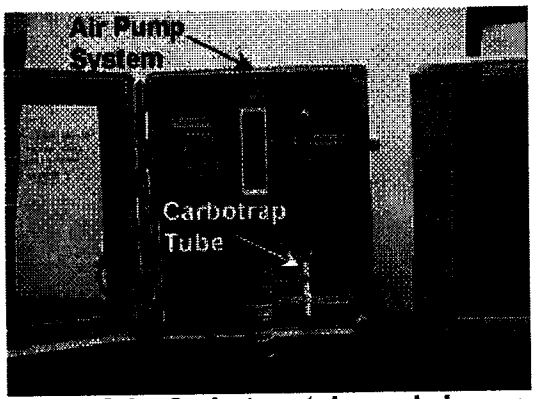


**Figure 2.2 Carbotrap tube and air pump system.**

[5] U.S. Environmental Protection Agency. 1999. *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air: Second Edition. Compendium Method TO-17: Determination of Volatile Organic Compounds in Ambient Air Using Active Sampling Onto Sorbent Tubes.* EPA/625/R-96/010b.

**Table 2.1 Air quality guidelines, point of impingement limits and odour thresholds for benzene, toluene, ethylbenzene and total xylenes ($\mu g/m^3$).**

| | Benzene | Toluene | Ethylbenzene | Xylenes |
|---|---|---|---|---|
| Alberta Ambient Air Quality Guideline (one-hour) | 30 | n/a | n/a | n/a |
| Ontario Point of Impingement Limit (half-hour) | n/a | 2000 | 3000 | 2300 |
| Odour Threshold (from Ruth, 1986) | 4500 | 8025 | 8700 | 348 |

## Air Quality Guidelines

The Alberta ambient air quality guideline for one-hour benzene concentrations is 30 $\mu g/m^3$ (micrograms of benzene per cubic meter of air). This guideline was developed based on the eight-hour occupational exposure limit divided by a safety factor of 100. Therefore, benzene concentrations higher than the Alberta one-hour ambient guideline will not necessarily cause negative effects to human or environmental health. This guideline is intended to provide an early warning of potential health impacts if these levels persist over an extended time period. Benzene can be detected as an odour at concentrations of about 4500 $\mu g/m^3$.[6]

Alberta does not have ambient air quality guidelines for toluene, ethylbenzene or xylenes. However, Ontario has half-hour air quality Point of Impingement Limits for these chemicals. The half-hour Point of Impingement Limits for toluene, ethylbenzene and xylenes in Ontario are 2000, 3000 and 2300 $\mu g/m^3$, respectively.[7] Odour thresholds for toluene, ethylbenzene, and xylenes are 8025, 8700 $\mu g/m^3$ and 348 $\mu g/m^3$, respectively.

[6] Ruth, J.H. 1986. *Odor thresholds and irritation levels of several chemical substances: a review.* Am. Ind. Hyg. Assoc. J 47: pp. A-142 to A-151.

[7] Ontario Ministry of the Environment. 1994. *Summary of Point of Impingement Standards, Point of Impingement Guidelines, and Ambient Air Quality Criteria (AAQCs).* Standards Development Branch.

## Results

Concentrations of toluene, ethylbenzene and xylenes were well below Ontario's Point of Impingement Limits in all samples collected in the Whitemud Drive area survey. Benzene concentrations were below Alberta's one-hour guideline in all but one sample.

The Alberta one-hour guideline for benzene was exceeded at Site #4 (Elmwood - 164$^{th}$ Street and 80$^{th}$ Avenue) on June 13, 2001 (6:49 a.m. to 7:56 a.m.). This sample was collected about 100 m from Whitemud Drive during the morning rush hour traffic. The benzene concentration in this sample was 35 $\mu g/m^3$ compared to the one-hour guideline of 30 $\mu g/m^3$. The air quality technologist reported very light wind conditions when this sample was collected. This exceedance may have been due to traffic on Whitemud Drive. Concentrations of toluene, ethylbenzene and xylenes in this sample were very low (below the analytical detection limit).

The next highest benzene concentration (13 $\mu g/m^3$) was measured on November 30, 2000 (7:48 a.m. to 8:49 a.m.) at Site #2 (John Janzen Nature Centre parking lot). The benzene concentration measured at this location was less than half of Alberta's one-hour guideline. Concentrations of toluene (22 $\mu g/m^3$) and xylenes (13 $\mu g/m^3$) were slightly elevated during this time period. The air quality technologist noted very slow

moving traffic on Quesnell Bridge when this sample was collected.

The highest toluene and ethylbenzene concentrations were measured at Site #2 (John Janzen Nature Centre parking lot) on November 30, 2000 (7:48 a.m. to 8:49 a.m.) for toluene and February 13, 2001 (7:40 a.m. to 8:44 a.m.) for ethylbenzene. The toluene (22 $\mu g/m^3$) and ethylbenzene (17 $\mu g/m^3$) concentrations in these samples were very low compared to the Ontario half-hour Point of Impingement Limits of 2000 and 3000 $\mu g/m^3$, respectively.

The maximum concentration of xylenes was measured on November 14, 2000 (4:23 p.m. to 5:23 p.m.) at Site #3a (Rio Terrace). The concentration of xylenes in this sample (22 $\mu g/m^3$) was very low compared to the Ontario half-hour Point of Impingement Limit of 2300 $\mu g/m^3$.

Maximum concentrations of benzene (35 $\mu g/m^3$), toluene (22 $\mu g/m^3$), ethylbenzene (17 $\mu g/m^3$) and xylenes (22 $\mu g/m^3$) were much lower than their respective odour thresholds. The odour thresholds for these chemicals are 4500, 8025, 8700 and 348 $\mu g/m^3$, respectively.

Concentrations of VOCs measured in samples collected near Whitemud Drive are presented in Figures 2.3 and 2.4 and Table 2.2.

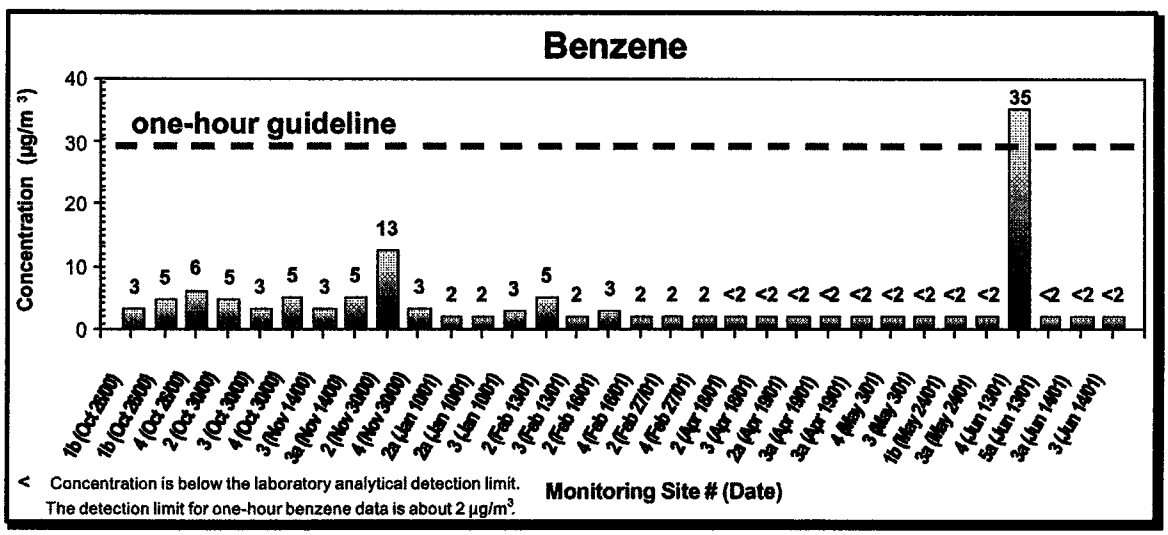


**Figure 2.3 Benzene concentrations in the Whitemud Drive area survey.**

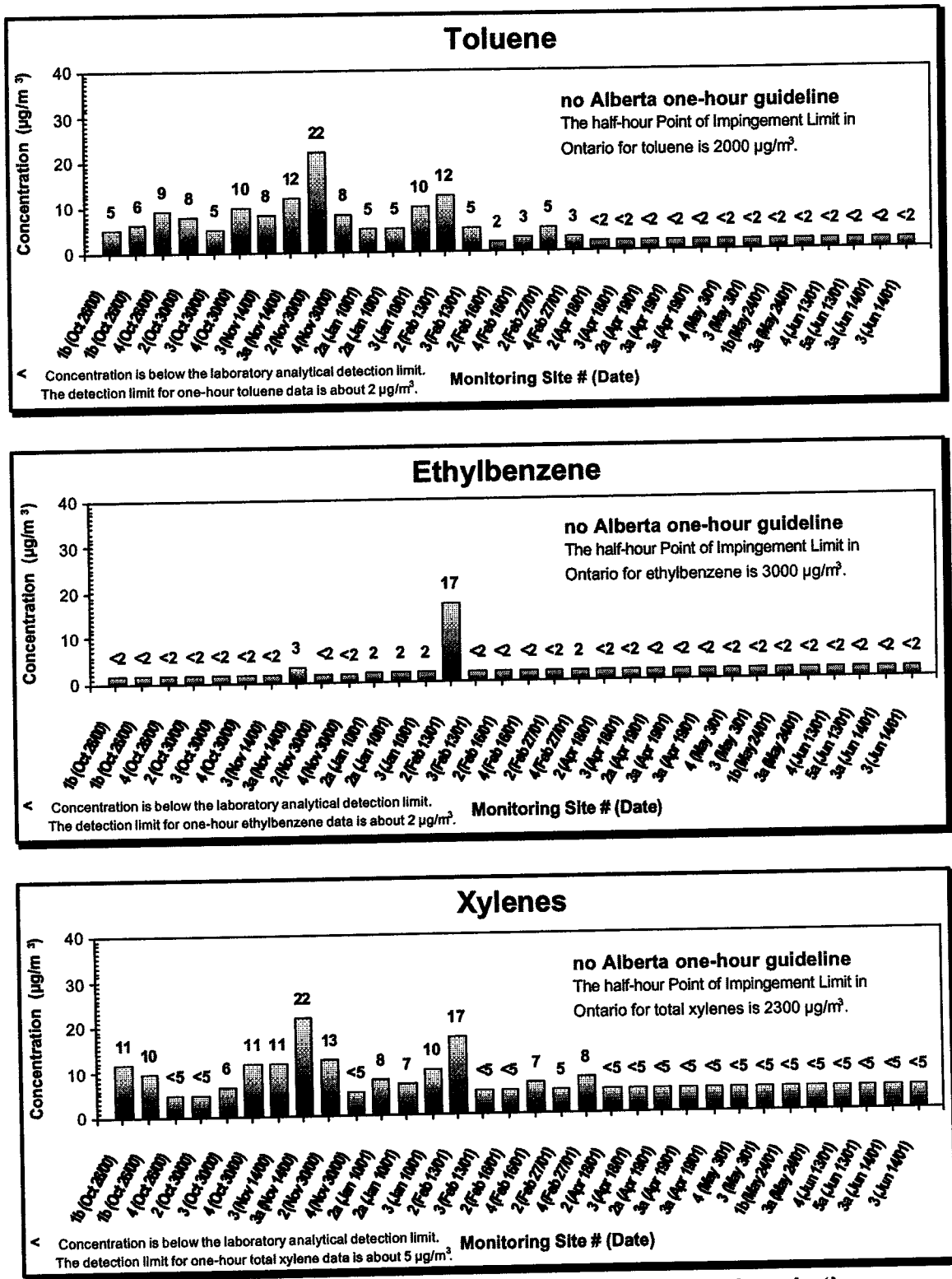


**Figure 2.4 Toluene, ethylbenzene and total xylene concentrations in the Whitemud Drive area survey.**

## Table 2.2 Benzene, toluene, ethylbenzene and total xylene concentrations in the Whitemud Drive area survey.

| Site # | Date | Sampling Time | Sampling Location | Benzene µg/m³ | Toluene µg/m³ | Ethylbenzene µg/m³ | Xylenes µg/m³ | Operator Comments |
|---|---|---|---|---|---|---|---|---|
| 1b | 26-Oct-00 | 6:42 a.m. to 7:44 a.m. | Brander Gardens | 3 | 5 | <2 | 11 | |
| 1b | 26-Oct-00 | 6:42 a.m. to 7:44 a.m. | Brander Gardens | 5 | 6 | <2 | 10 | Duplicate sample. |
| 4 | 26-Oct-00 | 2:46 p.m. to 3:47 p.m. | Elmwood | 6 | 9 | <2 | <5 | |
| 2 | 30-Oct-00 | 7:53 a.m. to 8:55 a.m. | John Janzen Nature Centre | 5 | 8 | <2 | <5 | |
| 3 | 30-Oct-00 | 4:15 p.m. to 5:15 p.m. | Lynnwood | 3 | 5 | <2 | 6 | Atmosphere looks hazy. Some exhaust drifting in from Whitemud Drive. |
| 4 | 30-Oct-00 | 6:54 p.m. to 7:54 p.m. | Elmwood | 5 | 10 | <2 | 11 | |
| 3 | 14-Nov-00 | 7:49 a.m. to 8:49 a.m. | Lynnwood | 3 | 8 | <2 | 11 | |
| 3a | 14-Nov-00 | 4:23 p.m. to 5:23 p.m. | Rio Terrace | 5 | 12 | 3 | 22 | |
| 2 | 30-Nov-00 | 7:48 a.m. to 8:49 a.m. | John Janzen Nature Centre | 13 | 22 | <2 | 13 | Traffic crawling on Quesnell Bridge (snowing - ESE wind). |
| 4 | 30-Nov-00 | 5:13 p.m. to 6:13 p.m. | Elmwood | 3 | 8 | <2 | <5 | Light snow. |
| 2a | 10-Jan-01 | 7:58 a.m. to 9:09 a.m. | Fox Dr on approach rd to Ft Edm | 2 | 5 | 2 | 8 | Normal traffic movement. |
| 2a | 10-Jan-01 | 7:58 a.m. to 9:09 a.m. | Fox Dr on approach rd to Ft Edm | 2 | 5 | 2 | 7 | Duplicate sample. |
| 3 | 10-Jan-01 | 4:17 p.m. to 5:26 p.m. | Lynnwood | 3 | 10 | 2 | 10 | |
| 2 | 13-Feb-01 | 7:40 a.m. to 8:44 a.m. | John Janzen Nature Centre | 5 | 12 | 17 | 17 | Wind shifted from SE to SW during sample period - brought wind across the parking lot instead of Whitemud Drive. |
| 3 | 13-Feb-01 | 5:08 p.m to 6:13 p.m. | Lynnwood | 2 | 5 | <2 | <5 | |
| 2 | 16-Feb-01 | 7:45 a.m. to 8:54 a.m. | John Janzen Nature Centre | 3 | 2 | <2 | <5 | Normal traffic movement. |
| 4 | 16-Feb-01 | 5:52 p.m. to 6:56 p.m. | Elmwood | 2 | 3 | <2 | 7 | |
| 2 | 27-Feb-01 | 7:47 a.m. to 8:49 a.m. | John Janzen Nature Centre | 2 | 5 | <2 | 5 | Light and variable wind. |
| 4 | 27-Feb-01 | 4:59 p.m. to 6:06 p.m. | Elmwood | 2 | 3 | 2 | 8 | Some exhaust from Whitemud Drive. |
| 2 | 18-Apr-01 | 6:39 a.m. to 7:49 a.m. | John Janzen Nature Centre | <2 | <2 | <2 | <5 | |
| 3 | 18-Apr-01 | 3:04 p.m. to 4:12 p.m. | Lynnwood | <2 | <2 | <2 | <5 | |
| 2a | 19-Apr-01 | 7:07 a.m. to 8:08 a.m. | Fox Dr on approach rd to Ft Edm | <2 | <2 | <2 | <5 | |
| 3a | 19-Apr-01 | 3:18 p.m. to 4:30 p.m. | Rio Terrace | <2 | <2 | <2 | <5 | |
| 3a | 19-Apr-01 | 3:18 p.m. to 4:30 p.m. | Rio Terrace | <2 | <2 | <2 | <5 | Duplicate sample. |
| 4 | 3-May-01 | 7:10 a.m. to 8:14 a.m. | Elmwood | <2 | <2 | <2 | <5 | |
| 3 | 3-May-01 | 3:29 p.m. to 4:36 p.m. | Lynnwood | <2 | <2 | <2 | <5 | |
| 1b | 24-May-01 | 5:49 a.m. to 6:49 a.m. | Brander Gardens | <2 | <2 | <2 | <5 | Elevated readings from Whitemud Drive. |
| 3a | 24-May-01 | 3:20 p.m. to 4:20 p.m. | Rio Terrace | <2 | <2 | <2 | <5 | Smoke in air from northern forest fires. |
| 4 | 13-Jun-01 | 6:49 a.m. to 7:56 a.m. | Elmwood | 35 | <2 | <2 | <5 | Winds light and variable. |
| 5a | 13-Jun-01 | 4:10 p.m. to 5:18 p.m. | Lymburn | <2 | <2 | <2 | <5 | Light rain. |
| 3a | 14-Jun-01 | 6:48 a.m. to 7:53 a.m. | Rio Terrace | <2 | <2 | <2 | <5 | Overcast, light variable wind - elevated readings from Whitemud Drive traffic. |
| 3 | 14-Jun-01 | 2:56 p.m. to 4:09 p.m. | Lynnwood | <2 | <2 | <2 | <5 | 80% overcast and no rain. |

# Appendix – Data Collected by the Mobile Air Monitoring Laboratory

## Table A1: Median one-hour air pollutant levels at each monitoring site in the Whitemud Drive area survey.

| Monitoring Location (# of hours sampled) | CO | $O_3$ | THC | $CH_4$ | RHC | $SO_2$ | NO | $NO_2$ | $NO_X$ | $NH_3$ | TRS | $H_2S$ | TSP | $PM_{10}$ | $PM_{2.5}$ | PAH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ppm | | | | | | | | | | | | $\mu g/m^3$ | | | $ng/m^3$ |
| Site # 1 (30) | 0.4 | 0.018 | 2.2 | 2.0 | 0.1 | 0.002 | 0.017 | 0.014 | 0.034 | 0.003 | 0.000 | 0.000 | 31 | 19 | 3 | 12 |
| Site # 2 (32) | 0.4 | 0.023 | 2.2 | 2.1 | 0.1 | 0.001 | 0.011 | 0.012 | 0.025 | 0.001 | 0.000 | 0.000 | 34 | 22 | 3 | 6 |
| Site # 3 (32) | 0.4 | 0.016 | 2.2 | 2.0 | 0.1 | 0.002 | 0.026 | 0.019 | 0.045 | 0.003 | 0.000 | 0.000 | 58 | 32 | 5 | 14 |
| Site # 4 (32) | 0.4 | 0.017 | 2.2 | 2.0 | 0.1 | 0.002 | 0.014 | 0.014 | 0.028 | 0.002 | 0.000 | 0.000 | 55 | 36 | 5 | 11 |
| Site # 5 (31) | 0.3 | 0.025 | 2.1 | 1.9 | 0.1 | 0.002 | 0.008 | 0.009 | 0.018 | 0.001 | 0.000 | 0.000 | 42 | 24 | 3 | 6 |
| Site # 6 (34) | 0.4 | 0.019 | 2.1 | 2.0 | 0.1 | 0.001 | 0.007 | 0.013 | 0.020 | 0.002 | 0.000 | 0.000 | 33 | 21 | 3 | 5 |
| **Overall Median** | **0.4** | **0.019** | **2.2** | **2.0** | **0.1** | **0.002** | **0.013** | **0.014** | **0.026** | **0.003** | **0.000** | **0.000** | **41** | **24** | **3** | **8** |

## Table A2: Median one-hour air pollutant levels at Alberta Environment monitoring stations in Edmonton and Calgary for the same monitoring period.

| Monitoring Location | CO | $O_3$ | THC | $CH_4$ | RHC | $SO_2$ | NO | $NO_2$ | $NO_X$ | $NH_3$ | TRS | $H_2S$ | TSP | $PM_{10}$ | $PM_{2.5}$ | PAH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ppm | | | | | | | | | | | | $\mu g/m^3$ | | | $ng/m^3$ |
| Whitemud Drive | 0.4 | 0.019 | 2.2 | 2.0 | 0.1 | 0.002 | 0.013 | 0.014 | 0.026 | 0.003 | 0.000 | 0.000 | 41 | 24 | 3 | 8 |
| Edmonton Central | 0.7 | 0.017 | 2.2 | no data | | | 0.019 | 0.023 | 0.042 | no data | | | | | 8 | no data |
| Edmonton Northwest | 0.6 | 0.022 | 2.2 | no data | | | 0.011 | 0.02 | 0.03 | no data | | | | 28 | 11 | no data |
| Edmonton East* | 0.3 | 0.026 | 2.2 | no data | | 0.002 | 0.006 | 0.01 | 0.02 | no data | | 0.000 | no data | 15 | 11 | no data |
| Calgary Central | 0.7 | 0.016 | 2.1 | no data | | | 0.019 | 0.03 | 0.05 | no data | | | | 26 | 10 | no data |
| Calgary Northwest | 0.3 | 0.027 | 2.1 | no data | | | 0.005 | 0.01 | 0.02 | no data | | | | | | |
| Calgary East | 0.5 | 0.020 | 2.1 | no data | | 0.003 | 0.027 | 0.02 | 0.05 | no data | | 0.001 | no data | | | |

* $PM_{10}$ data for Edmonton East is based on data collected in June 2000 only.

## Table A3: Median one-hour air pollutant levels during other Alberta Environment air monitoring surveys.

| Monitoring Survey (survey period) | CO | $O_3$ | THC | $CH_4$ | RHC | $SO_2$ | $NO_2$ | $NH_3$ | TRS | $H_2S$ | TSP | $PM_{10}$ | $PM_{2.5}$ | PAHs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ppm | | | | | | | | | | $\mu g/m^3$ | | | $ng/m^3$ |
| Whitemud Drive (Jun 00 to Jun 01) | 0.4 | 0.019 | 2.2 | 2.0 | 0.1 | 0.002 | 0.014 | 0.003 | 0.000 | 0.000 | 41 | 24 | 3 | 8 |
| Edson/Hinton (Sep 99 to Jun 00) | 0.1 | 0.031 | 1.9 | 1.8 | 0.1 | 0.001 | 0.004 | 0.002 | 0.000 | 0.001 | 49 | 29 | 4 | 1 |
| Whitecourt/Swan Hills (Nov 00 to Jun 01) | 0.2 | 0.027 | 2.3 | 2.0 | 0.3 | 0.004 | 0.005 | 0.001 | 0.001 | 0.000 | 47 | 29 | 4 | 1 |
| Bow Corridor (Dec 99 to Sep 00) | 0.2 | 0.030 | 1.9 | 1.8 | 0.1 | 0.001 | 0.007 | 0.001 | 0.001 | 0.000 | 74 | 40 | 4 | 4 |
| County of Grande Prairie (Dec 98 to Oct 99) | 0.2 | 0.036 | 2.0 | 1.7 | 0.2 | 0.001 | 0.002 | 0.001 | 0.000 | 0.000 | 14 | 9 | 2 | 2 |
| Caroline/Sundre (Apr 97 to Apr 98) | 0.3 | 0.042 | 2.1 | 1.8 | 0.2 | 0.002 | 0.009 | no data | 0.000 | 0.000 | 4 | 3 | 1 | no data |
| Lethbridge (Sep 98 to Jul 99) | 0.2 | 0.046 | 1.9 | 1.6 | 0.2 | 0.000 | 0.003 | 0.005 | 0.000 | 0.001 | 17 | 11 | 2 | 3 |
| Medicine Hat (May 98 to Jan 99) | 0.4 | 0.031 | 2.1 | 1.8 | 0.2 | 0.001 | 0.009 | 0.003 | 0.000 | 0.000 | 16 | 11 | 2 | 5 |
| Picture Butte/Sterling (Sep 98 to Jul 99) | 0.2 | 0.044 | 2.1 | 1.8 | 0.2 | 0.001 | 0.002 | 0.075 | 0.002 | 0.001 | 42 | 24 | 3 | 2 |

ppm - parts per million
$\mu g/m^3$ - micrograms per cubic metre of air
$ng/m^3$ - nanograms per cubic metre of air
no data - Indicates that parameter is not monitored or the analyzer was not operational.

Edmonton Central is located at 10255-104 Street
Edmonton Northwest is located at 13335-127 Street
Edmonton East is located at 105 Avenue and 17 Street

Calgary Central is located at 611-4 Street S.W.
Calgary Northwest is located at 39 Street and 29 Avenue N.W.
Calgary East is located at 49 Avenue and 15 Street S.E.

**List of Air Quality Parameters**

CO - carbon monoxide
$O_3$ - ozone
THC - total hydrocarbons
$CH_4$ - methane
RHC - reactive hydrocarbons
$SO_2$ - sulphur dioxide
NO - nitric oxide
$NO_2$ - nitrogen dioxide
$NO_X$ - total oxides of nitrogen
$NH_3$ - ammonia
TRS - total reduced sulphur
$H_2S$ - hydrogen sulphide
TSP - total suspended particulates
$PM_{10}$ - inhalable particulates
$PM_{2.5}$ - respirable particulates
PAH - polycyclic aromatic hydrocarbons

## Table A4: Maximum one-hour air pollutant levels at each monitoring site in the Whitemud Drive area survey.

| Monitoring Location (# of hours sampled) | CO | $O_3$ | THC | $CH_4$ | RHC | $SO_2$ | NO | $NO_2$ | $NO_X$ | $NH_3$ | TRS | $H_2S$ | TSP | $PM_{10}$ | $PM_{2.5}$ | PAH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ppm | | | | | | | | | | | | $\mu g/m^3$ | | | $ng/m^3$ |
| Site # 1 (30) | 0.9 | 0.052 | 3.1 | 2.3 | 0.8 | 0.012 | 0.091 | 0.031 | 0.116 | 0.015 | 0.004 | 0.001 | 282 | 230 | 19 | 48 |
| Site # 2 (32) | 1.1 | 0.053 | 3.4 | 2.5 | 1.0 | 0.010 | 0.089 | 0.032 | 0.121 | 0.012 | 0.004 | 0.001 | 241 | 135 | 16 | 43 |
| Site # 3 (32) | 1.8 | 0.045 | 3.4 | 2.3 | 1.0 | 0.011 | 0.201 | **0.041** | 0.243 | **0.039** | 0.002 | 0.002 | **459** | **239** | 17 | 77 |
| Site # 4 (32) | 2.7 | 0.041 | **4.4** | **2.7** | **1.6** | 0.007 | 0.212 | 0.038 | 0.246 | 0.022 | 0.004 | 0.002 | 238 | 164 | 24 | 58 |
| Site # 5 (31) | 1.9 | **0.059** | 3.8 | 2.4 | 1.3 | 0.011 | 0.188 | 0.034 | 0.220 | 0.024 | **0.005** | **0.003** | 185 | 103 | **37** | 55 |
| Site # 6 (34) | 2.2 | 0.050 | 3.9 | 2.5 | 1.3 | **0.015** | **0.230** | 0.036 | **0.262** | 0.018 | 0.003 | 0.002 | 428 | **239** | 28 | 76 |
| One-Hour Maximum | 2.7 | 0.059 | 4.4 | 2.7 | 1.6 | 0.015 | 0.230 | 0.041 | 0.262 | 0.039 | 0.005 | 0.003 | 459 | 239 | 37 | 77 |
| One-Hour Guideline | 13.0 | 0.082 | n/a | n/a | n/a | 0.172 | n/a | 0.212 | n/a | 2.0 | n/a | 0.010 | n/a | n/a | n/a | n/a |

## Table A5: Maximum one-hour air pollutant levels at Alberta Environment monitoring stations in Edmonton and Calgary for the same monitoring period.

| Monitoring Location | CO | $O_3$ | THC | $CH_4$ | RHC | $SO_2$ | NO | $NO_2$ | $NO_X$ | $NH_3$ | TRS | $H_2S$ | TSP | $PM_{10}$ | $PM_{2.5}$ | PAH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ppm | | | | | | | | | | | | $\mu g/m^3$ | | | $ng/m^3$ |
| Whitemud Drive | 2.7 | 0.059 | 4.4 | 2.7 | 1.6 | 0.015 | 0.230 | 0.041 | 0.262 | 0.039 | 0.005 | 0.003 | 459 | 239 | 37 | 77 |
| Edmonton Central | 4.8 | 0.047 | 2.6 | no data | | | 0.121 | 0.057 | 0.166 | no data | | | | | 275 | no data |
| Edmonton Northwest | 9.3 | 0.057 | 6.0 | no data | | | 0.731 | 0.073 | 0.804 | no data | | | | 304 | 261 | no data |
| Edmonton East* | 2.8 | 0.061 | 10.0 | no data | | 0.011 | 0.266 | 0.050 | 0.316 | no data | | 0.008 | no data | 161 | 276 | no data |
| Calgary Central | 3.6 | 0.049 | 2.9 | no data | | | 0.283 | 0.150 | 0.326 | no data | | | | 103 | 35 | no data |
| Calgary Northwest | 2.0 | 0.057 | 2.8 | no data | | | 0.150 | 0.049 | 0.174 | no data | | | | | | |
| Calgary East | 4.3 | 0.053 | 3.6 | no data | | 0.010 | 0.357 | 0.063 | 0.415 | no data | | 0.010 | no data | | | |
| One-Hour Guideline | 13.0 | 0.082 | n/a | n/a | n/a | 0.172 | n/a | 0.212 | n/a | 2.0 | n/a | 0.010 | n/a | n/a | n/a | n/a |

* $PM_{10}$ data for Edmonton East is based on data collected in June 2000 only.

## Table A6: Maximum one-hour air pollutant levels during other Alberta Environment air monitoring surveys.

| Monitoring Survey (survey period) | CO | $O_3$ | THC | $CH_4$ | RHC | $SO_2$ | $NO_2$ | $NH_3$ | TRS | $H_2S$ | TSP | $PM_{10}$ | $PM_{2.5}$ | PAHs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ppm | | | | | | | | | | $\mu g/m^3$ | | | $ng/m^3$ |
| Whitemud Drive (Jun 00 to Jun 01) | 2.7 | 0.059 | 4.4 | 2.7 | 1.6 | 0.015 | 0.041 | 0.039 | 0.005 | 0.003 | 459 | 239 | 37 | 77 |
| Edson/Hinton (Sep 99 to Jun 00) | 0.8 | 0.055 | 3.0 | 2.4 | 0.6 | 0.023 | 0.027 | 0.020 | 0.024 | 0.024 | 515 | 322 | 34 | 38 |
| Whitecourt/Swan Hills (Nov 00 to Jun 01) | 0.7 | 0.054 | 4.3 | 2.5 | 2.5 | 0.046 | 0.030 | 0.013 | 0.005 | 0.003 | 946 | 441 | 43 | 113 |
| Bow Corridor (Dec 99 to Sep 00) | 1.1 | 0.056 | 7.8 | 2.2 | 6.6 | 0.092 | 0.031 | 0.034 | 0.004 | 0.002 | 2082 | 1094 | 60 | 36 |
| County of Grande Prairie (Dec 98 to Oct 99) | 1.0 | 0.064 | 32.4 | 6.4 | 29.4 | 0.043 | 0.061 | 0.030 | 0.010 | 0.009 | 2305 | 1287 | 101 | 35 |
| Caroline/Sundre (Apr 97 to Apr 98) | 0.9 | 0.059 | 2.9 | 2.6 | 0.7 | 0.043 | 0.040 | no data | 0.008 | 0.008 | 52 | 43 | 17 | no data |
| Lethbridge (Sep 98 to Jul 99) | 2.4 | 0.062 | 2.2 | 1.9 | 0.4 | 0.007 | 0.016 | 0.020 | 0.001 | 0.003 | 405 | 363 | 294 | 21 |
| Medicine Hat (May 98 to Jan 99) | 2.8 | 0.062 | 2.6 | 2.3 | 0.4 | 0.029 | 0.080 | 0.027 | 0.001 | 0.004 | 213 | 135 | 12 | 35 |
| Picture Butte/Sterling (Sep 98 to Jul 99) | 1.2 | 0.059 | 9.5 | 7.1 | 1.6 | 0.004 | 0.013 | 1.364 | 0.054 | 0.054 | 490 | 298 | 32 | 11 |
| One-Hour Guideline | 13.0 | 0.082 | n/a | n/a | n/a | 0.172 | 0.212 | 2.0 | n/a | 0.010 | n/a | n/a | n/a | n/a |

ppm - parts per million
$\mu g/m^3$ - micrograms per cubic metre of air
$ng/m^3$ - nanograms per cubic metre of air
no data - Indicates that parameter is not monitored or the analyzer was not operational.

Edmonton Central is located at 10255-104 Street
Edmonton Northwest is located at 13335-127 Street
Edmonton East is located at 105 Avenue and 17 Street

Calgary Central is located at 611-4 Street S.W.
Calgary Northwest is located at 39 Street and 29 Avenue N.W.
Calgary East is located at 49 Avenue and 15 Street S.E.

**List of Air Quality Parameters**

CO - carbon monoxide
$O_3$ - ozone
THC - total hydrocarbons
$CH_4$ - methane
RHC - reactive hydrocarbons
$SO_2$ - sulphur dioxide
NO - nitric oxide
$NO_2$ - nitrogen dioxide
$NO_X$ - total oxides of nitrogen
$NH_3$ - ammonia
TRS - total reduced sulphur
$H_2S$ - hydrogen sulphide
TSP - total suspended particulates
$PM_{10}$ - inhalable particulates
$PM_{2.5}$ - respirable particulates
PAH - polycyclic aromatic hydrocarbons

# Table A7: One-hour average air pollutant levels in Whitemud Drive area survey (June 2000 and June 2001).

| Date | Monitoring Location and Time (MST) | CO | $O_3$ | THC | $CH_4$ | RHC | $SO_2$ | NO | $NO_2$ | $NO_X$ | $NH_3$ | TRS | $H_2S$ | TSP | $PM_{10}$ | $PM_{2.5}$ | PAH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ppm | | | | | | | | | | | | $\mu g/m^3$ | | | $ng/m^3$ |
| 21-Jun-00 | Site # 1 ( 5:27 a.m. to 6:26 a.m.) | 0.2 | 0.010 | 2.0 | 1.9 | 0.1 | 0.002 | 0.019 | 0.015 | 0.034 | 0.003 | 0.000 | 0.000 | 13 | 9 | 1 | 12 |
| | Site # 3 ( 6:37 a.m. to 7:36 a.m.) | 0.3 | 0.015 | 1.9 | 1.8 | 0.1 | 0.000 | 0.007 | 0.011 | 0.018 | 0.002 | 0.000 | 0.000 | 11 | 7 | 1 | 11 |
| | Site # 6A ( 7:50 a.m. to 8:49 a.m.) | 0.2 | 0.021 | 1.9 | 1.8 | 0.1 | 0.002 | 0.001 | 0.005 | 0.006 | 0.001 | 0.000 | 0.000 | 8 | 5 | 1 | 2 |
| | Site # 4A ( 8:55 a.m. to 9:54 a.m.) | 0.2 | 0.024 | 1.9 | 1.8 | 0.1 | 0.002 | 0.002 | 0.003 | 0.006 | 0.001 | 0.000 | 0.000 | 12 | 7 | 1 | 4 |
| | Site # 5 (10:22 a.m. to 11:22 a.m.) | 0.2 | 0.033 | 1.9 | 1.8 | 0.1 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 10 | 6 | 1 | 6 |
| | Site # 2 (11:40 a.m. to 12:40 p.m.) | 0.2 | 0.039 | 2.0 | 1.8 | 0.1 | 0.001 | 0.001 | 0.002 | 0.002 | 0.001 | 0.000 | 0.000 | 13 | 7 | 1 | 0 |
| | Site # 1 (12:49 p.m. to 2:04 p.m.) | 0.4 | 0.033 | 1.9 | 1.8 | 0.1 | 0.002 | 0.014 | 0.009 | 0.022 | 0.004 | 0.001 | 0.001 | 15 | 9 | 1 | 11 |
| | Site # 3A ( 2:13 p.m. to 3:14 p.m.) | 0.4 | 0.021 | 1.9 | 1.8 | 0.1 | 0.003 | 0.038 | 0.021 | 0.059 | 0.004 | 0.001 | 0.001 | 27 | 15 | 2 | 22 |
| | Site # 6A ( 3:20 p.m. to 4:21 p.m.) | 0.1 | 0.035 | 1.9 | 1.8 | 0.1 | 0.002 | 0.005 | 0.008 | 0.012 | 0.002 | 0.001 | 0.000 | 21 | 11 | 1 | 2 |
| | Site # 4A ( 4:26 p.m. to 5:28 p.m.) | 0.1 | 0.029 | 1.9 | 1.8 | 0.1 | 0.002 | 0.010 | 0.014 | 0.023 | 0.002 | 0.001 | 0.000 | 22 | 12 | 1 | 8 |
| | Site # 5A ( 5:38 p.m. to 6:39 p.m.) | 0.1 | 0.034 | 1.8 | 1.8 | 0.1 | 0.001 | 0.006 | 0.008 | 0.014 | 0.001 | 0.001 | 0.000 | 18 | 10 | 1 | 3 |
| | Site # 2 ( 6:49 p.m. to 7:49 p.m.) | 0.2 | 0.034 | 1.9 | 1.8 | 0.1 | 0.004 | 0.008 | 0.013 | 0.020 | 0.003 | 0.002 | 0.000 | 22 | 12 | 1 | 2 |
| 22-Jun-00 | Site # 4A ( 5:59 a.m. to 6:57 a.m.) | 0.2 | 0.017 | 1.9 | 1.9 | 0.0 | 0.001 | 0.009 | 0.011 | 0.020 | 0.000 | 0.000 | 0.000 | 33 | 21 | 2 | 8 |
| | Site # 3A ( 7:06 a.m. to 8:05 a.m.) | 0.3 | 0.014 | 1.9 | 1.9 | 0.0 | 0.003 | 0.042 | 0.021 | 0.062 | 0.001 | 0.000 | 0.000 | 34 | 19 | 2 | 21 |
| | Site # 6A ( 8:09 a.m. to 9:08 a.m.) | 0.1 | 0.030 | 1.8 | 1.8 | 0.0 | 0.001 | 0.005 | 0.006 | 0.011 | 0.000 | 0.000 | 0.000 | 18 | 10 | 1 | 2 |
| | Site # 5A ( 9:21 a.m. to 10:20 a.m.) | 0.1 | 0.031 | 1.8 | 1.8 | 0.0 | 0.000 | 0.005 | 0.005 | 0.010 | 0.000 | 0.000 | 0.000 | 14 | 9 | 1 | 4 |
| | Site # 2 (10:30 a.m. to 11:30 a.m.) | 0.2 | 0.037 | 1.9 | 1.8 | 0.0 | 0.000 | 0.003 | 0.002 | 0.005 | 0.001 | 0.000 | 0.000 | 22 | 13 | 1 | 1 |
| | Site # 1 (11:35 a.m. to 12:36 p.m.) | 0.4 | 0.031 | 1.9 | 1.8 | 0.1 | 0.001 | 0.012 | 0.009 | 0.020 | 0.003 | 0.000 | 0.000 | 26 | 16 | 2 | 8 |
| | Site # 4A (12:43 p.m. to 1:43 p.m.) | 0.1 | 0.038 | 1.9 | 1.8 | 0.0 | 0.002 | 0.004 | 0.005 | 0.007 | 0.000 | 0.000 | 0.000 | 30 | 17 | 2 | 3 |
| | Site # 3A ( 1:49 p.m. to 2:50 p.m.) | 0.4 | 0.019 | 1.9 | 1.8 | 0.1 | 0.006 | 0.048 | 0.030 | 0.078 | 0.003 | 0.000 | 0.001 | 35 | 20 | 3 | 29 |
| | Site # 6A ( 3:20 p.m. to 4:21 p.m.) | 0.1 | 0.042 | 1.8 | 1.8 | 0.0 | 0.002 | 0.000 | 0.003 | 0.003 | 0.000 | 0.000 | 0.000 | 19 | 12 | 1 | 0 |
| | Site # 5A ( 4:07 p.m. to 5:09 p.m.) | 0.2 | 0.039 | 1.9 | 1.8 | 0.1 | 0.003 | 0.001 | 0.005 | 0.005 | 0.000 | 0.000 | 0.000 | 39 | 21 | 2 | 1 |
| | Site # 2 ( 5:24 p.m. to 6:24 p.m.) | 0.1 | 0.037 | 1.9 | 1.8 | 0.0 | 0.002 | 0.002 | 0.004 | 0.006 | 0.000 | 0.000 | 0.000 | 12 | 8 | 1 | 1 |
| | Site # 1 ( 6:29 p.m. to 7:31 p.m.) | 0.1 | 0.032 | 1.8 | 1.8 | 0.0 | 0.002 | 0.005 | 0.009 | 0.014 | 0.001 | 0.000 | 0.000 | 11 | 6 | 1 | 2 |
| 13-Jun-01 | Site # 3 ( 5:39 a.m. to 6:39 a.m.) | 0.5 | 0.004 | 2.2 | 2.1 | 0.1 | 0.000 | 0.029 | 0.017 | 0.046 | 0.000 | 0.000 | 0.000 | 14 | 11 | 2 | 17 |
| | Site # 4 ( 6:49 a.m. to 7:56 a.m.) | 0.4 | 0.014 | 2.1 | 2.0 | 0.1 | 0.000 | 0.011 | 0.009 | 0.021 | 0.000 | 0.000 | 0.000 | 31 | 20 | 3 | 11 |
| | Site # 5A ( 8:13 a.m. to 9:12 a.m.) | 0.3 | 0.023 | 2.0 | 1.9 | 0.1 | 0.001 | 0.002 | 0.004 | 0.008 | 0.000 | 0.000 | 0.000 | 42 | 25 | 3 | 6 |
| | Site # 6A ( 9:24 a.m. to 10:22 a.m.) | 0.2 | 0.030 | 2.0 | 1.9 | 0.1 | 0.000 | 0.002 | 0.004 | 0.007 | 0.001 | 0.000 | 0.000 | 31 | 18 | 2 | 5 |
| | Site # 2A (10:31 a.m. to 11:30 a.m.) | 0.3 | 0.033 | 2.0 | 1.9 | 0.1 | 0.000 | 0.005 | 0.007 | 0.013 | 0.000 | 0.000 | 0.000 | 21 | 12 | 1 | 6 |
| | Site # 1 (11:37 a.m. to 12:36 p.m.) | 0.3 | 0.034 | 1.9 | 1.8 | 0.1 | 0.000 | 0.008 | 0.007 | 0.013 | 0.001 | 0.000 | 0.000 | 19 | 12 | 1 | 7 |
| | Site # 3A (12:47 p.m. to 1:46 p.m.) | 0.3 | 0.030 | 2.0 | 1.9 | 0.1 | 0.000 | 0.012 | 0.014 | 0.026 | 0.001 | 0.001 | 0.000 | 20 | 13 | 2 | 13 |
| | Site # 6A ( 1:50 p.m. to 2:51 p.m.) | 0.4 | 0.038 | 2.0 | 2.0 | 0.1 | 0.000 | 0.002 | 0.003 | 0.006 | 0.000 | 0.001 | 0.000 | 15 | 9 | 1 | 3 |
| | Site # 4A ( 2:57 p.m. to 3:59 p.m.) | 0.4 | 0.035 | 2.0 | 1.9 | 0.1 | 0.000 | 0.004 | 0.008 | 0.012 | 0.000 | 0.001 | 0.000 | 18 | 10 | 1 | 7 |
| | Site # 5A ( 4:10 p.m. to 5:18 p.m.) | 0.5 | 0.034 | 1.9 | 1.9 | 0.1 | 0.001 | 0.006 | 0.010 | 0.016 | 0.000 | 0.002 | 0.000 | 32 | 18 | 2 | 7 |
| | Site # 2 ( 5:28 p.m. to 6:28 p.m.) | 0.5 | 0.022 | 2.2 | 2.1 | 0.1 | 0.000 | 0.009 | 0.018 | 0.026 | 0.000 | 0.000 | 0.000 | 37 | 24 | 3 | 8 |
| | Site # 1B ( 6:34 p.m. to 7:33 p.m.) | 0.6 | 0.018 | 2.1 | 2.0 | 0.1 | 0.000 | 0.022 | 0.024 | 0.044 | 0.001 | 0.000 | 0.000 | 16 | 10 | 1 | 12 |
| 14-Jun-01 | Site # 4 ( 5:41 a.m. to 6:40 a.m.) | 0.7 | 0.007 | 2.2 | 2.2 | 0.1 | 0.000 | 0.016 | 0.014 | 0.029 | 0.002 | 0.001 | 0.001 | 26 | 17 | 3 | 10 |
| | Site # 3A ( 6:48 a.m. to 7:53 a.m.) | 0.9 | 0.003 | 2.3 | 2.2 | 0.2 | 0.000 | 0.065 | 0.029 | 0.093 | 0.004 | 0.001 | 0.001 | 64 | 40 | 5 | 42 |
| | Site # 6A ( 7:57 a.m. to 8:56 a.m.) | 0.6 | 0.004 | 2.2 | 2.2 | 0.1 | 0.001 | 0.020 | 0.027 | 0.046 | 0.005 | 0.001 | 0.001 | 30 | 20 | 3 | 13 |
| | Site # 1 ( 9:05 a.m. to 10:04 a.m.) | 0.6 | 0.008 | 2.1 | 2.1 | 0.1 | 0.000 | 0.026 | 0.020 | 0.046 | 0.005 | 0.000 | 0.001 | 26 | 18 | 3 | 19 |
| | Site # 5A (10:14 a.m. to 11:15 a.m.) | 0.3 | 0.012 | 2.0 | 2.0 | 0.0 | 0.000 | 0.014 | 0.016 | 0.029 | 0.005 | 0.001 | 0.000 | 36 | 22 | 3 | 14 |
| | Site # 2 (11:29 a.m. to 12:29 p.m.) | 0.4 | 0.012 | 2.1 | 2.1 | 0.1 | 0.000 | 0.014 | 0.016 | 0.030 | 0.004 | 0.000 | 0.001 | 24 | 14 | 2 | 12 |
| | Site # 4A (12:37 p.m. to 1:37 p.m.) | 0.5 | 0.020 | 2.1 | 2.0 | 0.1 | 0.001 | 0.012 | 0.014 | 0.027 | 0.004 | 0.000 | 0.000 | 22 | 13 | 2 | 9 |
| | Site # 6A ( 1:43 p.m. to 2:43 p.m.) | 0.3 | 0.032 | 2.0 | 1.9 | 0.1 | 0.001 | 0.006 | 0.008 | 0.014 | 0.005 | 0.001 | 0.000 | 14 | 8 | 1 | 2 |
| | Site # 3 ( 2:56 p.m. to 4:09 p.m.) | 0.4 | 0.037 | 1.9 | 1.8 | 0.1 | 0.001 | 0.004 | 0.008 | 0.012 | 0.005 | 0.001 | 0.000 | 14 | 9 | 1 | 2 |
| | Site # 1B ( 4:21 p.m. to 5:28 p.m.) | 0.4 | 0.037 | 1.9 | 1.8 | 0.1 | 0.000 | 0.003 | 0.006 | 0.009 | 0.003 | 0.001 | 0.000 | 30 | 15 | 2 | 5 |
| | Site # 5A ( 5:42 p.m. to 6:42 p.m.) | 0.2 | 0.034 | 1.9 | 1.8 | 0.0 | 0.000 | 0.003 | 0.007 | 0.011 | 0.002 | 0.000 | 0.000 | 13 | 8 | 1 | 5 |
| | Site # 2 ( 6:59 p.m. to 7:59 p.m.) | 0.3 | 0.035 | 2.0 | 2.0 | 0.0 | 0.000 | 0.001 | 0.005 | 0.007 | 0.001 | 0.000 | 0.000 | 13 | 7 | 1 | 1 |
| **one-hour guideline** | | **13.0** | **0.082** | **n/a** | **n/a** | **n/a** | **0.172** | **n/a** | **0.212** | **n/a** | **2.0** | **n/a** | **0.010** | **n/a** | **n/a** | **n/a** | **n/a** |

no data - Indicates that the analyzer was not operational for the indicated time period.
Data in *italics* indicates less than 75% data available for the hour.
Data in **bold** indicates the maximum concentration measured during the survey.
n/a No one hour guideline.
$ng/m^3$ - nanograms per cubic metre of air
$\mu g/m^3$ - micrograms per cubic metre of air
ppm - parts per million

**List of Air Quality Parameters**

CO - carbon monoxide; $O_3$ - ozone; THC - total hydrocarbons; $CH_4$ - methane; RHC - reactive hydrocarbons; $SO_2$ - sulphur dioxide; NO - nitric oxide; $NO_2$ - nitrogen dioxide; $NO_X$ - total oxides of nitrogen; $NH_3$ - ammonia; TRS - total reduced sulphur; $H_2S$ - hydrogen sulphide; TSP - total suspended particulates; $PM_{10}$ - inhalable particulates; $PM_{2.5}$ - respirable particulates; PAH - polycyclic aromatic hydrocarbons

# Table A8: One-hour average air pollutant levels in Whitemud Drive area survey (October and November, 2000).

| Date | Monitoring Location and Time (MST) | CO | $O_3$ | THC | $CH_4$ | RHC | $SO_2$ | NO | $NO_2$ | $NO_X$ | $NH_3$ | TRS | $H_2S$ | TSP | $PM_{10}$ | $PM_{2.5}$ | PAH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ppm | | | | | | | | | | | | $\mu g/m^3$ | | | $ng/m^3$ |
| 26-Oct-00 | Site # 2 ( 5:32 a.m. to 6:32 a.m.) | 0.2 | 0.005 | 2.0 | 2.0 | 0.1 | 0.001 | 0.028 | 0.016 | 0.044 | 0.006 | 0.000 | 0.000 | 19 | 13 | 3 | 17 |
| | Site # 1B ( 6:40 a.m. to 7:44 a.m.) | 0.6 | 0.003 | 2.0 | 2.0 | 0.0 | 0.003 | 0.091 | 0.029 | 0.116 | 0.011 | 0.000 | 0.000 | 19 | 13 | 3 | 48 |
| | Site # 4A ( 7:56 a.m. to 8:54 a.m.) | 0.2 | 0.007 | 1.9 | 2.0 | 0.0 | 0.001 | 0.008 | 0.015 | 0.022 | 0.007 | 0.000 | 0.000 | 19 | 13 | 3 | 9 |
| | Site # 6A ( 9:00 a.m. to 9:59 a.m.) | 0.2 | 0.010 | 2.0 | 2.1 | 0.0 | 0.001 | 0.008 | 0.013 | 0.019 | 0.006 | 0.000 | 0.000 | 20 | 13 | 3 | 21 |
| | Site # 3A (10:05 a.m. to 11:03 a.m.) | 0.1 | 0.014 | 2.0 | 2.1 | 0.0 | 0.002 | 0.009 | 0.010 | 0.018 | 0.003 | 0.000 | 0.000 | 25 | 16 | 3 | 7 |
| | Site # 5 (11:15 a.m. to 12:13 p.m.) | 0.1 | 0.019 | 2.0 | 2.0 | 0.0 | 0.003 | 0.011 | 0.009 | 0.018 | 0.006 | 0.000 | 0.000 | 29 | 20 | 3 | 6 |
| | Site # 2 (12:23 p.m. to 1:24 p.m.) | 0.2 | 0.018 | 2.0 | 2.1 | 0.0 | 0.003 | 0.017 | 0.009 | 0.025 | 0.005 | 0.001 | 0.000 | 40 | 26 | 4 | 12 |
| | Site # 1B ( 1:31 p.m. to 2:30 p.m.) | 0.2 | 0.017 | 1.9 | 2.0 | 0.0 | 0.004 | 0.032 | 0.013 | 0.042 | 0.011 | 0.001 | 0.000 | 56 | 37 | 5 | 18 |
| | Site # 4 ( 2:42 p.m. to 3:55 p.m.) | 0.2 | 0.020 | 1.8 | 1.8 | 0.0 | 0.003 | 0.017 | 0.011 | 0.027 | 0.006 | 0.001 | 0.000 | 90 | 50 | 6 | 11 |
| | Site # 5 ( 4:09 p.m. to 5:11 p.m.) | 0.2 | 0.021 | 1.7 | 1.8 | 0.0 | 0.002 | 0.009 | 0.012 | 0.020 | 0.005 | 0.001 | 0.000 | 121 | 65 | 6 | 10 |
| | Site # 3 ( 5:23 p.m. to 6:22 p.m.) | 0.3 | 0.022 | 1.7 | 1.7 | 0.0 | 0.001 | 0.009 | 0.011 | 0.018 | 0.004 | 0.001 | 0.000 | **459** | **239** | 17 | 6 |
| | Site # 6A ( 6:28 p.m. to 7:30 p.m.) | 0.2 | 0.027 | 2.3 | 2.3 | 0.1 | 0.001 | 0.003 | 0.006 | 0.008 | 0.003 | 0.001 | 0.000 | 123 | 68 | 6 | 2 |
| 30-Oct-00 | *Site # 2 ( 6:52 a.m. to 7:52 a.m.)* | *0.6* | *0.000* | *2.3* | *2.4* | *0.1* | *0.001* | *0.063* | *0.011* | *0.073* | *0.002* | *0.000* | *0.001* | *34* | *20* | *2* | *20* |
| | *Site # 3 ( 8:06 a.m. to 9:05 a.m.)* | *0.6* | *0.002* | *2.2* | *2.3* | *0.0* | *0.002* | *0.051* | *0.010* | *0.060* | *0.004* | *0.000* | *0.001* | *13* | *8* | *2* | *23* |
| | Site # 2 ( 7:52 a.m. to 8:56 a.m.) | 0.6 | 0.000 | 2.3 | 2.4 | 0.1 | 0.001 | 0.063 | 0.011 | 0.073 | 0.002 | 0.000 | 0.001 | 34 | 20 | 2 | 20 |
| | Site # 3 ( 9:06 a.m. to 10:05 a.m.) | 0.6 | 0.002 | 2.2 | 2.3 | 0.0 | 0.002 | 0.051 | 0.010 | 0.060 | 0.004 | 0.000 | 0.001 | 13 | 8 | 2 | 23 |
| | Site # 6B (10:13 a.m. to 11:12 a.m.) | 0.2 | 0.005 | 2.1 | 2.2 | 0.0 | 0.002 | 0.032 | 0.010 | 0.039 | 0.003 | 0.000 | 0.001 | 14 | 8 | 1 | 12 |
| | Site # 4 (11:34 a.m. to 12:33 p.m.) | 0.2 | 0.008 | 2.0 | 2.2 | 0.0 | 0.003 | 0.025 | 0.010 | 0.034 | 0.002 | 0.000 | 0.000 | 18 | 10 | 1 | 14 |
| | Site # 5 (12:43 p.m. to 1:42 p.m.) | 0.1 | 0.012 | 2.0 | 2.1 | 0.0 | 0.005 | 0.013 | 0.009 | 0.021 | 0.002 | 0.000 | 0.000 | 20 | 12 | 2 | 6 |
| | Site # 1B ( 1:53 p.m. to 2:53 p.m.) | 0.1 | 0.010 | 2.0 | 2.2 | 0.0 | 0.005 | 0.025 | 0.011 | 0.035 | 0.004 | 0.000 | 0.000 | 57 | 36 | 4 | 13 |
| | Site # 2 ( 3:00 p.m. to 4:02 p.m.) | 0.2 | 0.009 | 2.1 | 2.2 | 0.0 | 0.003 | 0.023 | 0.013 | 0.036 | 0.005 | 0.000 | 0.000 | 61 | 39 | 4 | 13 |
| | Site # 3 ( 4:10 p.m. to 5:19 p.m.) | 0.7 | 0.001 | 2.2 | 2.3 | 0.0 | 0.004 | 0.075 | 0.021 | 0.096 | 0.004 | 0.000 | 0.001 | 64 | 43 | 5 | 28 |
| | *Site # 5 ( 5:31 p.m. to 6:30 p.m.)* | *1.0* | *0.000* | *2.5* | *2.4* | *0.1* | *0.003* | *0.107* | *0.019* | *0.126* | *0.007* | *0.000* | *0.001* | *91* | *59* | *8* | *76* |
| | Site # 6A ( 5:51 p.m. to 6:39 p.m.) | 1.1 | 0.001 | 2.5 | 2.4 | 0.1 | 0.003 | 0.117 | 0.020 | 0.137 | 0.007 | 0.000 | 0.001 | 91 | 59 | 8 | 76 |
| | Site # 4 ( 6:48 p.m. to 8:03 p.m.) | 0.7 | 0.000 | 2.3 | 2.3 | 0.1 | 0.004 | 0.111 | 0.021 | 0.133 | 0.007 | 0.000 | 0.001 | 129 | 89 | 11 | 47 |
| | Site # 5 ( 8:14 p.m. to 9:16 p.m.) | 0.3 | 0.000 | 2.8 | 2.3 | 0.6 | 0.002 | 0.040 | 0.023 | 0.063 | 0.006 | 0.000 | 0.001 | 160 | 103 | 13 | 29 |
| 14-Nov-00 | Site # 1 ( 6:37 a.m. to 7:37 a.m.) | 0.6 | 0.003 | 2.3 | 2.3 | 0.0 | 0.002 | 0.042 | 0.024 | 0.066 | | 0.000 | 0.000 | 4 | 3 | 2 | 13 |
| | Site # 3 ( 7:50 a.m. to 8:53 a.m.) | 1.3 | 0.000 | 2.3 | 2.2 | 0.1 | 0.004 | 0.122 | 0.032 | 0.154 | | 0.000 | 0.000 | 8 | 6 | 2 | 58 |
| | Site # 6B ( 9:04 a.m. to 10:03 a.m.) | 0.5 | 0.012 | 2.1 | 2.2 | 0.0 | 0.003 | 0.011 | 0.018 | 0.029 | | 0.000 | 0.000 | 11 | 7 | 2 | 9 |
| | Site # 4 (10:29 a.m. to 11:29 a.m.) | 0.3 | 0.014 | 2.1 | 2.1 | 0.0 | 0.003 | 0.023 | 0.016 | 0.039 | | 0.000 | 0.000 | 34 | 20 | 3 | 15 |
| | Site # 5 (11:40 a.m. to 12:41 p.m.) | 0.2 | 0.024 | 1.7 | 1.8 | 0.0 | 0.002 | 0.008 | 0.009 | 0.018 | | 0.000 | 0.000 | 22 | 14 | 3 | 4 |
| | Site # 2 (12:55 p.m. to 1:53 p.m.) | 0.1 | 0.027 | 1.7 | 1.8 | 0.0 | 0.002 | 0.005 | 0.011 | 0.016 | | 0.000 | 0.000 | 12 | 8 | 2 | 5 |
| | Site # 1 ( 2:00 p.m. to 3:00 p.m.) | 0.2 | 0.021 | 1.8 | 1.8 | 0.0 | 0.002 | 0.017 | 0.013 | 0.029 | no data | 0.000 | 0.000 | 23 | 15 | 3 | 11 |
| | Site # 6A ( 3:12 p.m. to 4:13 p.m.) | 0.3 | 0.013 | 1.8 | 1.9 | 0.0 | 0.002 | 0.013 | 0.023 | 0.036 | | 0.000 | 0.000 | 17 | 11 | 2 | 11 |
| | Site # 3A ( 4:23 p.m. to 5:29 p.m.) | 1.8 | 0.001 | 2.1 | 2.0 | 0.0 | 0.006 | 0.201 | **0.041** | 0.243 | | 0.001 | 0.001 | 83 | 60 | 9 | 77 |
| | Site # 4A ( 5:36 p.m. to 6:37 p.m.) | 1.4 | 0.001 | 2.1 | 2.0 | 0.0 | 0.005 | 0.127 | 0.038 | 0.164 | | 0.002 | 0.000 | 32 | 24 | 5 | 56 |
| | Site # 5A ( 6:49 p.m. to 7:49 p.m.) | 0.7 | 0.001 | 2.0 | 2.0 | 0.0 | 0.003 | 0.106 | 0.034 | 0.140 | | 0.000 | 0.000 | 17 | 13 | 5 | 46 |
| | Site # 2 ( 8:02 p.m. to 9:03 p.m.) | 1.1 | 0.000 | 2.2 | 2.2 | 0.1 | 0.002 | 0.089 | 0.032 | 0.121 | | 0.000 | 0.000 | 33 | 26 | 5 | 29 |
| 30-Nov-00 | Site # 1B ( 6:34 a.m. to 7:35 a.m.) | 0.5 | 0.006 | 2.5 | 2.1 | 0.3 | 0.002 | 0.057 | 0.020 | 0.075 | 0.009 | 0.001 | 0.000 | 13 | 7 | 1 | 35 |
| | Site # 2 ( 7:49 a.m. to 8:50 a.m.) | 0.7 | 0.003 | 2.3 | 2.1 | 0.1 | 0.002 | 0.052 | 0.023 | 0.074 | 0.005 | 0.001 | 0.000 | 15 | 8 | 1 | 25 |
| | Site # 3 ( 9:01 a.m. to 10:01 a.m.) | 0.6 | 0.004 | 2.3 | 2.2 | 0.1 | 0.002 | 0.046 | 0.021 | 0.066 | 0.003 | 0.001 | 0.000 | 12 | 7 | 2 | 28 |
| | Site # 6A (10:07 a.m. to 11:07 a.m.) | 0.3 | 0.013 | 2.2 | 2.2 | 0.0 | 0.002 | 0.009 | 0.014 | 0.023 | 0.001 | 0.000 | 0.000 | 17 | 6 | 1 | 6 |
| | Site # 4 (11:16 a.m. to 12:17 p.m.) | 0.3 | 0.012 | 2.2 | 2.1 | 0.0 | 0.002 | 0.028 | 0.014 | 0.042 | 0.003 | 0.000 | 0.000 | 17 | 12 | 2 | 12 |
| | Site # 5 (12:28 p.m. to 1:27 p.m.) | 0.2 | 0.017 | 2.3 | 2.2 | 0.0 | 0.003 | 0.013 | 0.008 | 0.021 | 0.001 | 0.000 | 0.000 | 13 | 9 | 2 | 6 |
| | Site # 1B ( 1:40 p.m. to 2:41 p.m.) | 0.5 | 0.012 | 2.3 | 2.2 | 0.0 | 0.004 | 0.050 | 0.014 | 0.062 | 0.008 | 0.001 | 0.000 | 7 | 4 | 1 | 17 |
| | Site # 6A ( 2:52 p.m. to 3:53 p.m.) | 0.5 | 0.011 | 2.3 | 2.2 | 0.0 | 0.003 | 0.007 | 0.014 | 0.022 | 0.002 | 0.000 | 0.000 | 9 | 6 | 2 | 7 |
| | Site # 3 ( 4:01 p.m. to 5:02 p.m.) | 0.4 | 0.007 | 2.3 | 2.2 | 0.0 | 0.004 | 0.023 | 0.019 | 0.042 | 0.001 | 0.000 | 0.000 | 6 | 4 | 1 | 12 |
| | Site # 4 ( 5:14 p.m. to 6:15 p.m.) | 0.5 | 0.006 | 2.3 | 2.2 | 0.0 | 0.003 | 0.035 | 0.018 | 0.054 | 0.002 | 0.000 | 0.000 | 7 | 5 | 1 | 13 |
| | Site # 5 ( 6:37 p.m. to 7:38 p.m.) | 0.3 | 0.013 | 2.3 | 2.2 | 0.0 | 0.003 | 0.009 | 0.012 | 0.021 | 0.001 | 0.000 | 0.000 | 4 | 3 | 1 | 5 |
| | Site # 2 ( 7:48 p.m. to 8:49 p.m.) | 0.5 | 0.011 | 2.5 | 2.2 | 0.2 | 0.004 | 0.016 | 0.015 | 0.031 | 0.001 | 0.000 | 0.000 | 5 | 4 | 1 | 5 |
| **one-hour guideline** | | **13.0** | **0.082** | n/a | n/a | n/a | **0.172** | n/a | **0.212** | n/a | **2.0** | n/a | **0.010** | n/a | n/a | n/a | n/a |

no data - indicates that the analyzer was not operational for the indicated time period.
Data in *italics* indicates less than 75% data available for the hour.
Data in **bold** indicates the maximum concentration measured during the survey.

**List of Air Quality Parameters**

n/a No one hour guideline.
$ng/m^3$ - nanograms per cubic metre of air
$\mu g/m^3$ - micrograms per cubic metre of air
ppm - parts per million

CO - carbon monoxide
$O_3$ - ozone
THC - total hydrocarbons
$CH_4$ - methane
RHC - reactive hydrocarbons
$SO_2$ - sulphur dioxide
NO - nitric oxide
$NO_2$ - nitrogen dioxide
$NO_X$ - total oxides of nitrogen
$NH_3$ - ammonia
TRS - total reduced sulphur
$H_2S$ - hydrogen sulphide
TSP - total suspended particulates
$PM_{10}$ - inhalable particulates
$PM_{2.5}$ - respirable particulates
PAH - polycyclic aromatic hydrocarbons

# Table A9: One-hour average air pollutant levels in Whitemud Drive area survey (January and February, 2001).

| Date | Monitoring Location and Time (MST) | CO | $O_3$ | THC | $CH_4$ | RHC | $SO_2$ | NO | $NO_2$ | $NO_X$ | $NH_3$ | TRS | $H_2S$ | TSP | $PM_{10}$ | $PM_{2.5}$ | PAH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ppm | | | | | | | | | | | | $\mu g/m^3$ | | | $ng/m^3$ |
| 10-Jan-01 | Site # 1B ( 6:40 a.m. to 7:41 a.m.) | 0.6 | 0.007 | 3.0 | 2.2 | 0.7 | 0.001 | 0.042 | 0.021 | 0.064 | 0.010 | 0.000 | 0.001 | 8 | 5 | 1 | 20 |
| | Site # 2A ( 7:58 a.m. to 9:09 a.m.) | 0.6 | 0.005 | 3.1 | 2.3 | 0.7 | 0.001 | 0.037 | 0.023 | 0.060 | 0.012 | 0.000 | 0.001 | 11 | 8 | 2 | 20 |
| | Site # 3 ( 9:16 a.m. to 10:18 a.m.) | 0.5 | 0.005 | 3.1 | 2.3 | 0.8 | 0.001 | 0.052 | 0.024 | 0.076 | 0.010 | 0.000 | 0.001 | 19 | 14 | 3 | 23 |
| | Site # 6A (10:24 a.m. to 11:23 a.m.) | 0.3 | 0.008 | 3.1 | 2.3 | 0.7 | 0.001 | 0.017 | 0.017 | 0.034 | 0.010 | 0.000 | 0.000 | 19 | 14 | 2 | 8 |
| | Site # 4 (11:32 a.m. to 12:32 p.m.) | 0.5 | 0.009 | 3.1 | 2.3 | 0.8 | 0.004 | 0.048 | 0.018 | 0.067 | 0.012 | 0.000 | 0.001 | 81 | 51 | 7 | 25 |
| | Site # 5 (12:43 p.m. to 1:42 p.m.) | 0.4 | 0.016 | 3.1 | 2.3 | 0.8 | 0.002 | 0.016 | 0.017 | 0.033 | 0.011 | 0.000 | 0.001 | 51 | 31 | 4 | 13 |
| | Site # 1 ( 1:59 p.m. to 3:00 p.m.) | 0.4 | 0.013 | 3.1 | 2.2 | 0.8 | 0.003 | 0.017 | 0.021 | 0.038 | 0.008 | 0.000 | 0.001 | 79 | 45 | 6 | 12 |
| | Site # 2A ( 3:08 p.m. to 4:06 p.m.) | 1.1 | 0.002 | 3.4 | 2.3 | 1.0 | 0.003 | 0.089 | 0.030 | 0.120 | 0.012 | 0.000 | 0.001 | 241 | 135 | 16 | 32 |
| | Site # 3 ( 4:17 p.m. to 5:26 p.m.) | 1.5 | 0.001 | 3.4 | 2.3 | 1.0 | 0.004 | 0.154 | 0.033 | 0.187 | 0.020 | 0.001 | 0.002 | 132 | 90 | 14 | 64 |
| | Site # 6 ( 5:41 p.m. to 6:40 p.m.) | 2.2 | 0.001 | 3.9 | 2.5 | 1.3 | 0.004 | **0.230** | 0.033 | **0.262** | 0.018 | 0.001 | 0.002 | 66 | 49 | 11 | 49 |
| | Site # 4 ( 6:54 p.m. to 7:57 p.m.) | **2.7** | 0.001 | **4.4** | **2.7** | **1.6** | 0.003 | 0.212 | 0.034 | 0.246 | 0.022 | 0.001 | 0.002 | 114 | 80 | 14 | 58 |
| | Site # 5 ( 8:07 p.m. to 9:06 p.m.) | 1.9 | 0.001 | 3.8 | 2.4 | 1.3 | 0.003 | 0.188 | 0.031 | 0.220 | 0.016 | 0.002 | **0.003** | 85 | 66 | 13 | 55 |
| 13-Feb-01 | Site # 1B ( 6:29 a.m. to 7:31 a.m.) | 0.7 | 0.001 | 2.3 | 2.3 | 0.1 | 0.001 | 0.079 | 0.024 | 0.104 | 0.004 | 0.000 | 0.001 | 41 | 32 | 6 | 23 |
| | Site # 2 ( 7:40 a.m. to 8:44 a.m.) | 0.6 | 0.002 | 2.7 | 2.4 | 0.2 | 0.000 | 0.013 | 0.014 | 0.028 | 0.001 | 0.000 | 0.000 | 34 | 24 | 5 | 5 |
| | Site # 6B ( 8:50 a.m. to 9:49 a.m.) | 0.5 | 0.004 | 2.4 | 2.2 | 0.2 | 0.001 | 0.039 | 0.023 | 0.062 | 0.005 | 0.000 | 0.000 | 170 | 102 | 11 | 19 |
| | Site # 3 ( 9:58 a.m. to 10:59 a.m.) | 0.4 | 0.009 | 2.4 | 2.2 | 0.1 | 0.003 | 0.036 | 0.020 | 0.056 | 0.003 | 0.000 | 0.000 | 43 | 30 | 5 | 9 |
| | Site # 4 (11:16 a.m. to 12:16 p.m.) | 0.4 | 0.013 | 2.2 | 2.2 | 0.0 | 0.004 | 0.032 | 0.018 | 0.050 | 0.005 | 0.000 | 0.000 | 100 | 63 | 9 | 14 |
| | Site # 5 (12:25 p.m. to 1:28 p.m.) | 0.3 | 0.020 | 2.1 | 2.1 | 0.0 | 0.006 | 0.011 | 0.013 | 0.024 | 0.003 | 0.000 | 0.000 | 79 | 45 | 6 | 4 |
| | Site # 1B ( 1:39 p.m. to 2:40 p.m.) | 0.5 | 0.015 | 2.1 | 2.1 | 0.0 | 0.006 | 0.040 | 0.017 | 0.057 | 0.004 | 0.000 | 0.000 | 90 | 59 | 9 | 17 |
| | Site # 2 ( 2:47 p.m. to 3:49 p.m.) | 0.4 | 0.018 | 2.0 | 2.1 | 0.0 | 0.002 | 0.015 | 0.016 | 0.031 | 0.004 | 0.000 | 0.000 | 80 | 47 | 6 | 8 |
| | Site # 6B ( 3:54 p.m. to 4:59 p.m.) | 0.3 | 0.020 | 2.0 | 2.1 | 0.0 | 0.002 | 0.003 | 0.014 | 0.018 | 0.003 | 0.000 | 0.000 | 263 | 153 | 15 | 4 |
| | Site # 3 ( 5:08 p.m. to 6:13 p.m.) | 0.4 | 0.013 | 2.0 | 2.0 | 0.0 | 0.002 | 0.013 | 0.022 | 0.035 | 0.002 | 0.000 | 0.000 | 63 | 42 | 6 | 7 |
| | Site # 4 ( 6:22 p.m. to 7:22 p.m.) | 0.4 | 0.017 | 2.0 | 2.1 | 0.0 | 0.002 | 0.012 | 0.018 | 0.031 | 0.002 | 0.000 | 0.000 | 85 | 55 | 7 | 10 |
| | Site # 6 ( 7:34 p.m. to 8:35 p.m.) | 0.4 | 0.018 | 2.1 | 2.1 | 0.0 | 0.001 | 0.007 | 0.014 | 0.021 | 0.005 | 0.000 | 0.000 | 47 | 31 | 5 | 5 |
| 16-Feb-01 | Site # 6A ( 6:34 a.m. to 7:34 a.m.) | 0.8 | 0.001 | 2.0 | 2.0 | 0.0 | 0.000 | 0.023 | 0.027 | 0.049 | 0.003 | 0.000 | 0.000 | 10 | 7 | 1 | 8 |
| | Site # 2 ( 7:45 a.m. to 8:54 a.m.) | 0.6 | 0.011 | 2.1 | 2.1 | 0.1 | 0.000 | 0.004 | 0.010 | 0.015 | 0.001 | 0.000 | 0.000 | 7 | 5 | 2 | 3 |
| | Site # 6B ( 9:16 a.m. to 10:20 a.m.) | 0.4 | 0.014 | 2.1 | 2.0 | 0.0 | 0.002 | 0.015 | 0.016 | 0.030 | 0.006 | 0.001 | 0.000 | 11 | 8 | 2 | 5 |
| | Site # 3 (10:27 a.m. to 11:27 a.m.) | 0.5 | 0.018 | 2.0 | 2.0 | 0.0 | 0.002 | 0.017 | 0.013 | 0.031 | 0.004 | 0.000 | 0.000 | 45 | 32 | 6 | 6 |
| | Site # 4 (11:33 a.m. to 12:33 p.m.) | 0.3 | 0.019 | 1.9 | 1.9 | 0.0 | 0.005 | 0.025 | 0.014 | 0.039 | 0.002 | 0.000 | 0.000 | 238 | 164 | 24 | 11 |
| | Site # 5 (12:43 p.m. to 1:43 p.m.) | 0.4 | 0.026 | 1.9 | 1.9 | 0.0 | 0.004 | 0.008 | 0.008 | 0.016 | 0.001 | 0.000 | 0.000 | 68 | 46 | 7 | 4 |
| | Site # 1B ( 1:53 p.m. to 3:18 p.m.) | 0.2 | 0.030 | 1.8 | 1.9 | 0.0 | 0.001 | 0.002 | 0.005 | 0.008 | 0.000 | 0.000 | 0.000 | 33 | 21 | 4 | 2 |
| | Site # 2A ( 3:24 p.m. to 4:21 p.m.) | 0.2 | 0.028 | 1.8 | 1.9 | 0.0 | 0.001 | 0.013 | 0.011 | 0.023 | 0.004 | 0.000 | 0.000 | 187 | 114 | 14 | 6 |
| | Site # 3 ( 4:29 p.m. to 5:31 p.m.) | 0.3 | 0.017 | 1.9 | 1.9 | 0.0 | 0.002 | 0.022 | 0.017 | 0.039 | 0.002 | 0.000 | 0.000 | 85 | 52 | 8 | 8 |
| | Site # 4 ( 5:52 p.m. to 6:56 p.m.) | 0.7 | 0.003 | 1.9 | 1.9 | 0.0 | 0.002 | 0.068 | 0.033 | 0.101 | 0.004 | 0.000 | 0.000 | 187 | 120 | 16 | 23 |
| | Site # 5 ( 7:05 p.m. to 8:04 p.m.) | 0.5 | 0.007 | 1.9 | 1.9 | 0.0 | 0.001 | 0.013 | 0.029 | 0.042 | 0.001 | 0.000 | 0.000 | 76 | 49 | 6 | 26 |
| | Site # 6B ( 8:23 p.m. to 9:22 p.m.) | 0.7 | 0.001 | 2.1 | 2.0 | 0.0 | 0.001 | 0.044 | 0.035 | 0.080 | 0.001 | 0.000 | 0.000 | 74 | 50 | 8 | 28 |
| 27-Feb-01 | Site # 1 ( 6:41 a.m. to 7:40 a.m.) | 0.6 | 0.009 | 2.7 | 2.0 | 0.7 | 0.006 | 0.015 | 0.026 | 0.040 | 0.005 | 0.001 | 0.000 | 6 | 3 | 1 | 12 |
| | Site # 2 ( 7:47 a.m. to 8:49 a.m.) | 0.6 | 0.007 | 3.3 | 2.4 | 0.9 | 0.003 | 0.022 | 0.016 | 0.038 | 0.007 | 0.001 | 0.000 | 18 | 14 | 3 | 4 |
| | Site # 5 ( 9:01 a.m. to 10:00 a.m.) | 0.4 | 0.025 | 2.5 | 1.9 | 0.7 | 0.005 | 0.010 | 0.013 | 0.022 | 0.008 | 0.001 | 0.000 | 12 | 7 | 1 | 7 |
| | Site # 4 (10:12 a.m. to 11:11 a.m.) | 0.4 | 0.021 | 2.5 | 1.8 | 0.7 | 0.006 | 0.027 | 0.018 | 0.045 | 0.007 | 0.001 | 0.000 | 133 | 75 | 10 | 21 |
| | Site # 3 (11:19 a.m. to 12:18 p.m.) | 0.3 | 0.028 | 2.5 | 1.8 | 0.7 | 0.009 | 0.014 | 0.013 | 0.026 | 0.008 | 0.001 | 0.000 | 94 | 56 | 8 | 5 |
| | Site # 6B (12:25 p.m. to 1:25 p.m.) | 0.4 | 0.029 | 2.5 | 1.8 | 0.6 | **0.015** | 0.012 | 0.013 | 0.024 | 0.008 | 0.001 | 0.000 | 36 | 21 | 4 | 2 |
| | Site # 1 ( 1:36 p.m. to 2:35 p.m.) | 0.2 | 0.029 | 2.5 | 1.9 | 0.6 | 0.012 | 0.010 | 0.013 | 0.022 | 0.006 | 0.002 | 0.001 | 43 | 28 | 5 | 5 |
| | Site # 2A ( 2:42 p.m. to 3:41 p.m.) | 0.3 | 0.028 | 2.5 | 1.8 | 0.7 | 0.010 | 0.019 | 0.017 | 0.035 | 0.008 | 0.001 | 0.001 | 138 | 91 | 12 | 9 |
| | Site # 5 ( 3:50 p.m. to 4:50 p.m.) | 0.3 | 0.025 | 2.5 | 1.8 | 0.6 | 0.011 | 0.010 | 0.019 | 0.028 | 0.008 | 0.001 | 0.001 | 58 | 35 | 6 | 6 |
| | Site # 4 ( 4:59 p.m. to 6:06 p.m.) | 0.9 | 0.008 | 2.5 | 1.8 | 0.7 | 0.007 | 0.043 | 0.036 | 0.078 | 0.009 | 0.001 | 0.001 | 145 | 96 | 14 | 26 |
| | Site # 3 ( 6:15 p.m. to 7:16 p.m.) | 1.5 | 0.001 | 2.6 | 1.9 | 0.7 | 0.009 | 0.109 | **0.041** | 0.149 | 0.010 | 0.002 | 0.002 | 124 | 93 | 17 | 28 |
| | Site # 6B ( 7:22 p.m. to 8:22 p.m.) | 1.7 | 0.004 | 3.1 | 2.1 | 0.9 | 0.008 | 0.132 | 0.036 | 0.169 | 0.008 | 0.002 | 0.002 | 99 | 79 | 16 | 30 |
| **one-hour guideline** | | **13.0** | **0.082** | **n/a** | **n/a** | **n/a** | **0.172** | **n/a** | **0.212** | **n/a** | **2.0** | **n/a** | **0.010** | **n/a** | **n/a** | **n/a** | **n/a** |

no data - Indicates that the analyzer was not operational for the indicated time period.
Data in *italics* indicates less than 75% data available for the hour.
Data in **bold** indicates the maximum concentration measured during the survey.
n/a No one hour guideline.
$ng/m^3$ - nanograms per cubic metre of air
$\mu g/m^3$ - micrograms per cubic metre of air
ppm - parts per million

**List of Air Quality Parameters**

CO - carbon monoxide; $O_3$ - ozone; THC - total hydrocarbons; $CH_4$ - methane; RHC - reactive hydrocarbons; $SO_2$ - sulphur dioxide; NO - nitric oxide; $NO_2$ - nitrogen dioxide; $NO_X$ - total oxides of nitrogen; $NH_3$ - ammonia; TRS - total reduced sulphur; $H_2S$ - hydrogen sulphide; TSP - total suspended particulates; $PM_{10}$ - inhalable particulates; $PM_{2.5}$ - respirable particulates; PAH - polycyclic aromatic hydrocarbons

# Table A10: One-hour average air pollutant levels in Whitemud Drive area survey (April and May, 2001).

| Date | Monitoring Location and Time (MST) | CO | $O_3$ | THC | $CH_4$ | RHC | $SO_2$ | NO | $NO_2$ | $NO_X$ | $NH_3$ | TRS | $H_2S$ | TSP | $PM_{10}$ | $PM_{2.5}$ | PAH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ppm | | | | | | | | | | | | $\mu g/m^3$ | | | $ng/m^3$ |
| 18-Apr-01 | Site # 1 ( 5:34 a.m. to 6:34 a.m.) | 0.4 | 0.009 | 2.6 | 2.0 | 0.5 | 0.005 | 0.019 | 0.031 | 0.047 | 0.000 | 0.003 | 0.000 | 45 | 31 | 5 | 10 |
| | Site # 2 ( 6:39 a.m. to 7:49 a.m.) | 0.2 | 0.024 | 2.6 | 2.1 | 0.5 | 0.004 | 0.005 | 0.010 | 0.012 | 0.000 | 0.002 | 0.000 | 65 | 44 | 6 | 1 |
| | Site # 3 ( 8:03 a.m. to 9:04 a.m.) | 1.6 | 0.027 | 2.5 | 1.9 | 0.5 | 0.011 | 0.017 | 0.023 | 0.037 | 0.001 | 0.002 | 0.000 | 70 | 44 | 6 | 8 |
| | Site # 6B ( 9:14 a.m. to 10:14 a.m.) | 0.6 | 0.045 | 2.4 | 1.9 | 0.4 | 0.008 | 0.006 | 0.010 | 0.012 | 0.000 | 0.002 | 0.000 | 52 | 30 | 5 | 1 |
| | Site # 4 (10:25 a.m. to 11:25 a.m.) | 0.6 | 0.041 | 2.4 | 1.9 | 0.4 | 0.005 | 0.011 | 0.014 | 0.021 | 0.000 | 0.003 | 0.000 | 64 | 39 | 6 | 10 |
| | Site # 5 (11:34 a.m. to 12:33 p.m.) | 1.0 | 0.049 | 2.4 | 1.9 | 0.4 | 0.006 | 0.002 | 0.004 | 0.006 | 0.000 | **0.005** | 0.000 | 41 | 24 | 5 | 2 |
| | Site # 1 (12:45 p.m. to 1:45 p.m.) | 0.5 | 0.049 | 2.3 | 1.9 | 0.4 | 0.005 | 0.001 | 0.004 | 0.005 | 0.000 | 0.004 | 0.001 | 49 | 29 | 5 | 2 |
| | Site # 2 ( 1:50 p.m. to 2:52 p.m.) | 0.3 | 0.051 | 2.3 | 1.9 | 0.4 | 0.004 | 0.001 | 0.003 | 0.004 | 0.000 | 0.004 | 0.000 | 71 | 42 | 7 | 1 |
| | Site # 3 ( 3:04 p.m. to 4:12 p.m.) | 0.3 | 0.045 | 2.3 | 1.8 | 0.4 | 0.004 | 0.005 | 0.009 | 0.014 | 0.000 | 0.002 | 0.000 | 176 | 108 | 14 | 5 |
| | Site # 6B ( 4:19 p.m. to 5:20 p.m.) | 0.4 | 0.050 | 2.3 | 1.9 | 0.4 | 0.004 | 0.004 | 0.005 | 0.008 | 0.000 | 0.003 | 0.000 | 428 | 239 | 28 | 2 |
| | Site # 4 ( 5:29 p.m. to 6:31 p.m.) | 0.8 | 0.035 | 2.4 | 1.9 | 0.4 | 0.005 | 0.007 | 0.018 | 0.025 | 0.000 | 0.004 | 0.000 | 77 | 46 | 7 | 8 |
| | Site # 5 ( 6:38 p.m. to 7:40 p.m.) | 0.1 | 0.043 | 2.3 | 1.8 | 0.4 | 0.004 | 0.001 | 0.007 | 0.008 | 0.000 | 0.003 | 0.000 | 78 | 47 | 8 | 3 |
| 19-Apr-01 | Site # 1 ( 5:51 a.m. to 6:54 a.m.) | 0.7 | 0.023 | 2.4 | 1.9 | 0.4 | 0.005 | 0.015 | 0.018 | 0.032 | 0.000 | 0.002 | 0.001 | 75 | 47 | 8 | 14 |
| | Site # 2A ( 7:07 a.m. to 8:08 a.m.) | 0.5 | 0.024 | 2.4 | 1.9 | 0.4 | 0.004 | 0.008 | 0.020 | 0.027 | 0.000 | 0.002 | 0.001 | 186 | 114 | 16 | 9 |
| | Site # 3A ( 8:19 a.m. to 9:18 a.m.) | 0.3 | 0.030 | 2.3 | 1.9 | 0.4 | 0.004 | 0.017 | 0.015 | 0.032 | 0.008 | 0.002 | 0.001 | 71 | 48 | 9 | 14 |
| | Site # 6A ( 9:22 a.m. to 10:24 a.m.) | 0.5 | 0.040 | 2.4 | 1.9 | 0.4 | 0.004 | 0.004 | 0.006 | 0.010 | 0.000 | 0.002 | 0.001 | 71 | 45 | 8 | 3 |
| | Site # 4A (10:29 a.m. to 11:29 a.m. | 0.6 | 0.039 | 2.3 | 1.9 | 0.4 | 0.004 | 0.006 | 0.008 | 0.015 | 0.000 | 0.002 | 0.000 | 46 | 32 | 7 | 5 |
| | Site # 5A (11:40 a.m. to 12:41 p.m. | 0.4 | 0.044 | 2.3 | 1.8 | 0.4 | 0.004 | 0.002 | 0.004 | 0.008 | 0.000 | 0.002 | 0.000 | 54 | 35 | 8 | 3 |
| | Site # 1 (12:54 p.m. to 1:53 p.m.) | 0.8 | 0.038 | 2.4 | 1.8 | 0.4 | 0.005 | 0.011 | 0.009 | 0.020 | 0.002 | 0.003 | 0.000 | 55 | 36 | 7 | 8 |
| | Site # 2A ( 2:10 p.m. to 3:11 p.m.) | 0.9 | 0.037 | 2.2 | 1.8 | 0.3 | 0.001 | 0.006 | 0.008 | 0.013 | 0.001 | 0.000 | 0.000 | 68 | 37 | 5 | 6 |
| | Site # 3A ( 3:18 p.m. to 4:30 p.m.) | 0.6 | 0.025 | 2.2 | 1.9 | 0.3 | 0.002 | 0.029 | 0.016 | 0.046 | 0.004 | 0.000 | 0.001 | 61 | 31 | 4 | 14 |
| | Site # 6A ( 4:33 p.m. to 5:33 p.m.) | 0.4 | 0.036 | 2.2 | 1.8 | 0.3 | 0.000 | 0.003 | 0.005 | 0.008 | 0.002 | 0.000 | 0.000 | 65 | 37 | 5 | 2 |
| | Site # 4A ( 5:38 p.m. to 6:38 p.m.) | 0.5 | 0.033 | 2.2 | 1.8 | 0.3 | 0.000 | 0.004 | 0.007 | 0.011 | 0.001 | 0.000 | 0.000 | 204 | 100 | 9 | 10 |
| | Site # 5A ( 6:48 p.m. to 7:48 p.m.) | 0.3 | 0.034 | 2.2 | 1.8 | 0.3 | 0.000 | 0.002 | 0.004 | 0.006 | 0.000 | 0.000 | 0.000 | 43 | 23 | 2 | 1 |
| 3-May-01 | Site # 5 ( 5:51 a.m. to 6:51 a.m.) | 0.5 | 0.014 | 2.5 | 2.4 | 0.1 | 0.001 | 0.018 | 0.020 | 0.036 | 0.004 | 0.000 | 0.000 | 85 | 43 | 4 | 14 |
| | Site # 4 ( 7:10 a.m. to 8:14 a.m.) | 0.3 | 0.014 | 2.5 | 2.4 | 0.1 | 0.002 | 0.030 | 0.020 | 0.050 | 0.007 | 0.001 | 0.000 | 64 | 40 | 5 | 21 |
| | Site # 3 ( 8:22 a.m. to 9:20 a.m.) | 0.1 | 0.034 | 2.4 | 2.3 | 0.1 | 0.001 | 0.005 | 0.010 | 0.015 | 0.001 | 0.001 | 0.000 | 72 | 42 | 5 | 5 |
| | Site # 6B ( 9:29 a.m. to 10:28 a.m.) | 0.4 | 0.041 | 2.3 | 2.2 | 0.1 | 0.000 | 0.003 | 0.004 | 0.007 | 0.001 | 0.001 | 0.000 | 43 | 24 | 3 | 2 |
| | Site # 2A (10:41 a.m. to 11:40 a.m.) | 0.0 | 0.042 | 2.3 | 2.3 | 0.1 | 0.000 | 0.001 | 0.002 | 0.003 | 0.000 | 0.000 | 0.000 | 41 | 21 | 2 | 1 |
| | Site # 1A (12:02 p.m. to 12:59 p.m.) | 0.1 | 0.044 | 2.2 | 2.1 | 0.1 | 0.000 | 0.001 | 0.002 | 0.002 | 0.000 | 0.000 | 0.000 | 33 | 19 | 2 | 1 |
| | Site # 5 ( 1:12 p.m. to 2:12 p.m.) | 0.5 | 0.041 | 2.1 | 2.0 | 0.1 | 0.000 | 0.001 | 0.002 | 0.004 | 0.000 | 0.000 | 0.000 | 43 | 24 | 2 | 3 |
| | Site # 4 ( 2:22 p.m. to 3:21 p.m.) | 0.5 | 0.032 | 2.2 | 2.0 | 0.2 | 0.000 | 0.010 | 0.010 | 0.021 | 0.002 | 0.000 | 0.000 | 47 | 27 | 3 | 11 |
| | Site # 3 ( 3:29 p.m. to 4:36 p.m.) | 0.2 | 0.033 | 2.1 | 2.0 | 0.1 | 0.000 | 0.005 | 0.009 | 0.015 | 0.001 | 0.000 | 0.000 | 55 | 29 | 3 | 6 |
| | Site # 6 ( 4:45 p.m. to 5:44 p.m.) | 0.2 | 0.040 | 2.1 | 1.9 | 0.1 | 0.000 | 0.001 | 0.002 | 0.003 | 0.001 | 0.000 | 0.000 | 59 | 34 | 3 | 2 |
| | Site # 2 ( 5:53 p.m. to 6:54 p.m.) | 0.3 | 0.027 | 2.2 | 2.0 | 0.1 | 0.000 | 0.005 | 0.012 | 0.017 | 0.002 | 0.000 | 0.000 | 70 | 40 | 4 | 6 |
| | Site # 1 ( 7:01 p.m. to 7:59 p.m.) | 0.3 | 0.029 | 2.1 | 1.9 | 0.2 | 0.000 | 0.001 | 0.011 | 0.011 | 0.001 | 0.000 | 0.000 | 172 | 95 | 8 | 2 |
| 24-May-01 | Site # 1B ( 5:49 a.m. to 6:49 a.m.) | 0.9 | 0.002 | 2.5 | 2.3 | 0.2 | 0.001 | 0.076 | 0.028 | 0.102 | 0.001 | 0.001 | 0.001 | 140 | 92 | 12 | 39 |
| | Site # 2 ( 7:01 a.m. to 8:01 a.m.) | 0.9 | 0.002 | 2.7 | 2.5 | 0.2 | 0.000 | 0.062 | 0.023 | 0.085 | 0.000 | 0.001 | 0.000 | 200 | 128 | 15 | 43 |
| | Site # 6B ( 8:05 a.m. to 9:05 a.m.) | 0.8 | 0.010 | 2.5 | 2.3 | 0.2 | 0.000 | 0.024 | 0.019 | 0.043 | 0.000 | 0.000 | 0.000 | 230 | 141 | 16 | 21 |
| | Site # 3A ( 9:24 a.m. to 10:24 a.m.) | 0.6 | 0.016 | 2.3 | 2.2 | 0.1 | 0.001 | 0.041 | 0.020 | 0.060 | **0.039** | 0.000 | 0.000 | 103 | 59 | 8 | 30 |
| | Site # 4A (10:31 a.m. to 11:31 a.m.) | 0.4 | 0.037 | 2.2 | 2.0 | 0.1 | 0.000 | 0.009 | 0.007 | 0.015 | 0.008 | 0.000 | 0.000 | 117 | 62 | 8 | 8 |
| | Site # 5A (11:42 a.m. to 12:42 p.m.) | 1.1 | **0.059** | 2.3 | 1.9 | 0.4 | 0.000 | 0.006 | 0.010 | 0.016 | 0.024 | 0.000 | 0.000 | 185 | 102 | **37** | 8 |
| | Site # 1B (12:57 p.m. to 1:57 p.m.) | 0.6 | 0.052 | 2.3 | 1.9 | 0.4 | 0.000 | 0.007 | 0.010 | 0.015 | 0.015 | 0.000 | 0.000 | 282 | 230 | 19 | 6 |
| | Site # 2A ( 2:11 p.m. to 3:11 p.m.) | 0.5 | 0.053 | 2.2 | 2.0 | 0.2 | 0.000 | 0.005 | 0.006 | 0.009 | 0.008 | 0.000 | 0.000 | 89 | 51 | 10 | 2 |
| | Site # 3A ( 3:20 p.m. to 4:20 p.m.) | 0.9 | 0.036 | 2.1 | 1.8 | 0.3 | 0.001 | 0.022 | 0.023 | 0.044 | 0.010 | 0.000 | 0.000 | 100 | 60 | 15 | 18 |
| | Site # 6A ( 4:29 p.m. to 5:29 p.m.) | 0.7 | 0.044 | 2.1 | 1.9 | 0.2 | 0.000 | 0.004 | 0.013 | 0.017 | 0.010 | 0.000 | 0.000 | 88 | 52 | 13 | 5 |
| | Site # 4A ( 5:34 p.m. to 6:34 p.m.) | 0.7 | 0.033 | 2.1 | 1.9 | 0.2 | 0.000 | 0.007 | 0.018 | 0.024 | 0.006 | 0.000 | 0.000 | 63 | 39 | 9 | 8 |
| | Site # 5A ( 6:44 p.m. to 7:44 p.m.) | 0.6 | 0.027 | 2.1 | 1.9 | 0.2 | 0.000 | 0.008 | 0.018 | 0.025 | 0.009 | 0.000 | 0.000 | 69 | 44 | 11 | 7 |
| **one-hour guideline** | | **13.0** | **0.082** | **n/a** | **n/a** | **n/a** | **0.172** | **n/a** | **0.212** | **n/a** | **2.0** | **n/a** | **0.010** | **n/a** | **n/a** | **n/a** | **n/a** |

no data - Indicates that the analyzer was not operational for the indicated time period.
Data in *italics* indicates less than 75% data available for the hour.
Data in **bold** indicates the maximum concentration measured during the survey.
n/a No one hour guideline.
$ng/m^3$ - nanograms per cubic metre of air
$\mu g/m^3$ - micrograms per cubic metre of air
ppm - parts per million

**List of Air Quality Parameters**

CO - carbon monoxide; $O_3$ - ozone; THC - total hydrocarbons; $CH_4$ - methane; RHC - reactive hydrocarbons; $SO_2$ - sulphur dioxide; NO - nitric oxide; $NO_2$ - nitrogen dioxide; $NO_X$ - total oxides of nitrogen; $NH_3$ - ammonia; TRS - total reduced sulphur; $H_2S$ - hydrogen sulphide; TSP - total suspended particulates; $PM_{10}$ - inhalable particulates; $PM_{2.5}$ - respirable particulates; PAH - polycyclic aromatic hydrocarbons

## Table A11 Weather conditions and operator's observations in Whitemud Drive area survey (June 2000 and June 2001).

| Date | Monitoring Location and Time (MST) | MAML Operator's Comments and Observations | Temp. °C | RH % | WSP km/h | Cloud | WDR |
|---|---|---|---|---|---|---|---|
| 21-Jun-00 | Site # 1 ( 5:27 a.m. to 6:26 a.m.) | Brookside. | 14 | 68 | 7 | 100% | SW |
| | Site # 3 ( 6:37 a.m. to 7:36 a.m.) | Spitting rain. | 15 | 67 | 8 | 100% | W |
| | Site # 6B ( 7:50 a.m. to 8:49 a.m.) | Quesnell Heights. | 16 | 64 | 6 | 80% | SW |
| | Site # 4A ( 8:55 a.m. to 9:54 a.m.) | Patricia Heights. | 18 | 51 | 8 | 10% | W |
| | Site # 5 (10:22 a.m. to 11:22 a.m.) | Aldergrove. | 21 | 36 | 13 | 10% | W |
| | Site # 2 (11:40 a.m. to 12:40 p.m.) | Fort Edmonton. | 21 | 33 | 8 | 20% | SW |
| | Site # 1 (12:49 p.m. to 2:04 p.m.) | Brookside. | 21 | 30 | 14 | 60% | NW |
| | Site # 3A ( 2:13 p.m. to 3:14 p.m.) | Rio Terrace. All exhaust readings from this hr are from the fwy. | 24 | 26 | 5 | 60% | S |
| | Site # 6B ( 3:20 p.m. to 4:21 p.m.) | Quesnell Heights. | 22 | 28 | 7 | 50% | V |
| | Site # 4A ( 4:26 p.m. to 5:28 p.m.) | Patricia Heights. | 23 | 26 | 6 | 40% | V |
| | Site # 5A ( 5:38 p.m. to 6:39 p.m.) | Lymburn 5:40PM-No readings from lawn mower operating 20m in front of MAML 5:42PM-Mowing stopped. | 21 | 27 | 8 | 70% | W |
| | Site # 2 ( 6:49 p.m. to 7:49 p.m.) | Fort Edmonton. | 20 | 26 | 4 | 70% | NW |
| 22-Jun-00 | Site # 4A ( 5:59 a.m. to 6:57 a.m.) | Patricia Heights. | 14 | 54 | 9 | 0% | W |
| | Site # 3A ( 7:06 a.m. to 8:05 a.m.) | Rio Terrace. | 17 | 40 | 6 | 0% | V |
| | Site # 6B ( 8:09 a.m. to 9:08 a.m.) | QuesnellHeights. | 17 | 38 | 8 | 0% | W |
| | Site # 5A ( 9:21 a.m. to 10:20 a.m.) | Lymburn. | 19 | 33 | 11 | 0% | W |
| | Site # 2 (10:30 a.m. to 11:30 a.m.) | Stop at site #2. | 19 | 33 | 8 | 60% | SW |
| | Site # 1 (11:35 a.m. to 12:36 p.m.) | Brookside. | 19 | 32 | 11 | 80% | W |
| | Site # 4A (12:43 p.m. to 1:43 p.m.) | Patricia Heights. 1:39 PM- Exhaust from cement truck nearby. | 21 | 27 | 9 | 60% | SW |
| | Site # 3A ( 1:49 p.m. to 2:50 p.m.) | Rio Terrace. All exhaust readings from this hour are from the fwy. | 21 | 28 | 4 | 50% | S |
| | Site # 6B ( 3:20 p.m. to 4:21 p.m.) | QuesnellHeights. | 21 | 28 | 8 | 50% | SW |
| | Site # 5A ( 4:07 p.m. to 5:09 p.m.) | Lymburn. | 17 | 40 | 13 | 80% | SW |
| | Site # 2 ( 5:24 p.m. to 6:24 p.m.) | Fort Edmonton. | 17 | 47 | 8 | 80% | SW |
| | Site # 1 ( 6:29 p.m. to 7:31 p.m.) | Brookside. | 18 | 45 | 8 | 20% | SW |
| 13-Jun-01 | Site # 3 ( 5:39 a.m. to 6:39 a.m.) | Some rain showers. | 11 | 90 | 4 | 80% | W |
| | Site # 4 ( 6:49 a.m. to 7:56 a.m.) | Set out carbotrap #30 and blank #31. | 14 | 75 | 6 | 60% | V |
| | Site # 5A ( 8:13 a.m. to 9:12 a.m.) | Stop at Site #5A. | 15 | 67 | 5 | 40% | W |
| | Site # 6B ( 9:24 a.m. to 10:22 a.m.) | 9:39AM-Lawn mowing going on around the MAML. 9:43AM-Lawn mowers gone. | 18 | 52 | 5 | 40% | SW |
| | Site # 2A (10:31 a.m. to 11:30 a.m.) | Stop at Site #2A. | 19 | 44 | 9 | 20% | W |
| | Site # 1 (11:37 a.m. to 12:36 p.m.) | Stop at Site #1. | 20 | 38 | 9 | 40% | W |
| | Site # 3A (12:47 p.m. to 1:46 p.m.) | Stop at Site #3A. | 21 | 35 | 6 | 20% | SW |
| | Site # 6B ( 1:50 p.m. to 2:51 p.m.) | Stop at Site #6B. | 22 | 30 | 6 | 30% | SW |
| | Site # 4A ( 2:57 p.m. to 3:59 p.m.) | Stop at Site #4A. | 23 | 27 | 7 | 20% | SW |
| | Site # 5A ( 4:10 p.m. to 5:18 p.m.) | Setout carbotrap # 32. Light rain. | 21 | 31 | 7 | 30% | SW |
| | Site # 2 ( 5:28 p.m. to 6:28 p.m.) | 5:42PM-stopped raining. | 17 | 58 | 4 | 100% | E |
| | Site # 1B ( 6:34 p.m. to 7:33 p.m.) | Stop at Site #1B. | 19 | 39 | 4 | | NE |
| 14-Jun-01 | Site # 4 ( 5:41 a.m. to 6:40 a.m.) | Wind shifted to a more northerly component. Swirling lt wind giving readings from fwy. | 12 | 78 | 5 | 80% | W |
| | Site # 3A ( 6:48 a.m. to 7:53 a.m.) | Start carbotrap #33. | 14 | 70 | 3 | | SW |
| | Site # 6B ( 7:57 a.m. to 8:56 a.m.) | Stop at Site #6B. | 14 | 74 | 3 | ovcst | SW |
| | Site # 1 ( 9:05 a.m. to 10:04 a.m.) | Overcast sky, light rain. | 13 | 83 | 5 | ovcst | NW |
| | Site # 5A (10:14 a.m. to 11:15 a.m.) | Some rain. | 13 | 80 | 7 | ovcst | V |
| | Site # 2 (11:29 a.m. to 12:29 p.m.) | Parking lot is filling up. | 14 | 78 | 4 | ovcst | SE |
| | Site # 4A (12:37 p.m. to 1:37 p.m.) | Stop at Site #4A. | 15 | 64 | 7 | ovcst | NE |
| | Site # 6B ( 1:43 p.m. to 2:43 p.m.) | Stop at Site #6B. | 19 | 45 | 5 | 70% | SE |
| | Site # 3 ( 2:56 p.m. to 4:09 p.m.) | Set out carbotrap # 34. | 20 | 38 | 4 | 80% | SE |
| | Site # 1B ( 4:21 p.m. to 5:28 p.m.) | Normal traffic. | 18 | 46 | 5 | 70% | W |
| | Site # 5A ( 5:42 p.m. to 6:42 p.m.) | Stop at Site #5A. | 17 | 55 | 9 | ovcst | NW |
| | Site # 2 ( 6:59 p.m. to 7:59 p.m.) | Stop at site #2. | 16 | 57 | 7 | n/a | NW |

**List of Weather Parameters**

Temp. - ambient temperature in degrees Celcius
RH - relative humidity in percent
WSP - wind speed in kilometers per hour
WDR - wind direction
Cloud - percent cloud cover
V - Variable winds

## Table A12 Weather conditions and operator's observations in Whitemud Drive area survey (October and November 2000).

| Date | Monitoring Location and Time (MST) | MAML Operator's Comments and Observations | Temp. °C | RH % | WSP km/h | Cloud | WDR |
|---|---|---|---|---|---|---|---|
| 26-Oct-00 | Site # 2 ( 5:32 a.m. to 6:32 a.m.) | Site #2. | 6 | 84 | 9 | dark | E |
| | Site # 1B ( 6:40 a.m. to 7:44 a.m.) | Brander Gardens. 6:42AM-set out carbotraps. | 5 | 87 | 9 | dark | E |
| | Site # 4A ( 7:56 a.m. to 8:54 a.m.) | Patricia Heights. | 5 | 85 | 9 | overcast | E |
| | Site # 6B ( 9:00 a.m. to 9:59 a.m.) | Quesnell Heights. | 5 | 84 | 11 | overcast | E |
| | Site # 3A (10:05 a.m. to 11:03 a.m.) | Rio Terrace. | 8 | 72 | 9 | 80% | SE |
| | Site # 5 (11:15 a.m. to 12:13 p.m.) | Aldergrove. | 10 | 65 | 14 | 60% | SE |
| | Site # 2 (12:23 p.m. to 1:24 p.m.) | Site #2. | 12 | 59 | 14 | 20% | SE |
| | Site # 1B ( 1:31 p.m. to 2:30 p.m.) | Brander Gardens. 6:42 AM-set out carbotrap tubes. | 13 | 55 | 18 | 10% | SE |
| | Site # 4 ( 2:42 p.m. to 3:55 p.m.) | 2:44 PM-Elmwood. Set out carbotrap #03. | 15 | 48 | 10 | 10% | SE |
| | Site # 5 ( 4:09 p.m. to 5:11 p.m.) | Aldergrove. | 13 | 55 | 13 | 10% | SE |
| | Site # 3 ( 5:23 p.m. to 6:22 p.m.) | Lynnwood. 5:25PM-Note: high particulates. | 12 | 53 | 7 | 30% | SE |
| | Site # 6B ( 6:28 p.m. to 7:30 p.m.) | Quesnell Heights. 6:30PM-Elevated THC & particulates due to local traffic on Quesnell Cr. | 11 | 55 | 8 | dark | SE |
| 30-Oct-00 | *Site # 1B ( 6:34 a.m. to 6:56 a.m.)* | *Riverbend.* | *1* | *92* | *3* | *dark* | *SE* |
| | *Site # 1B ( 7:08 a.m. to 7:45 a.m.)* | *Riverbend.* | *0* | *95* | *2* | *dark* | *V* |
| | Site # 2 ( 7:52 a.m. to 8:56 a.m.) | Fort Edmonton. | 0 | 96 | 3 | 80% | SW |
| | Site # 3 ( 9:06 a.m. to 10:05 a.m.) | Lynnwood. Light snow. | 3 | 80 | 3 | 60% | S |
| | Site # 6C (10:13 a.m. to 11:12 a.m.) | Laurier Heights. | 8 | 57 | 4 | 10% | S |
| | Site # 4 (11:34 a.m. to 12:33 p.m.) | Elmwood. | 8 | 60 | 4 | 10% | S |
| | Site # 5 (12:43 p.m. to 1:42 p.m.) | Aldergrove. | 8 | 60 | 7 | 0% | S |
| | Site # 1B ( 1:53 p.m. to 2:53 p.m.) | Riverbend. | 11 | 53 | 7 | 0% | S |
| | Site # 2 ( 3:00 p.m. to 4:02 p.m.) | Fort Edmonton. | 11 | 52 | 7 | 0% | SW |
| | Site # 3 ( 4:10 p.m. to 5:19 p.m.) | Lynnwood. 4:11PM-set out carbo trap #5. Atmosphere looks hazy. 5:01PM-elevated exh. drifting in from fwy. | 9 | 60 | 1 | hazy | S |
| | *Site # 6B ( 5:24 p.m. to 5:38 p.m.)* | *Quesnell Heights. Still elevated exhaust even while traveling to this site. Elevated PAH's would indicate Whitemud diesel exhaust.* | *6* | *75* | *2* | *0%* | *N* |
| | Site # 6B ( 5:51 p.m. to 6:39 p.m.) | Still elevated PAH's. Some influence from local traffic. | 4 | 85 | 1 | hazy | V |
| | Site # 4 ( 6:48 p.m. to 8:03 p.m.) | Set out carbo tube #6. | 4 | 81 | 3 | dark | S |
| | Site # 5 ( 8:14 p.m. to 9:16 p.m.) | Aldergrove. | 3 | 82 | 2 | dark | SE |
| 14-Nov-00 | Site # 1 ( 6:37 a.m. to 7:37 a.m.) | Start hour average. | -5.0 | 89 | 6.1 | 0% | SW |
| | Site # 3 ( 7:50 a.m. to 8:53 a.m.) | Lynnwood. | -4.2 | 86 | 5.4 | 0% | W |
| | Site # 6C ( 9:04 a.m. to 10:03 a.m.) | Laurier Heights. | -2.4 | 79 | 3.5 | 0% | W |
| | Site # 4 (10:29 a.m. to 11:29 a.m.) | Elmwood. | 0.7 | 66 | 7.5 | 0% | W |
| | Site # 5 (11:40 a.m. to 12:41 p.m.) | Aldergrove. | 3.2 | 61 | 8.5 | 0% | W |
| | Site # 2 (12:55 p.m. to 1:53 p.m.) | Fort Edmonton. | 3.5 | 60 | 10.7 | 0% | N |
| | Site # 1 ( 2:00 p.m. to 3:00 p.m.) | Brookside. | 2 | 65 | 12 | 0% | N |
| | Site # 6B ( 3:12 p.m. to 4:13 p.m.) | QuesnellHeights. | 2 | 68 | 6 | 10% | W |
| | Site # 3A ( 4:23 p.m. to 5:29 p.m.) | Rio Terrace. 4:25PM-set out carbo trap. | 0 | 77 | 3 | 0% | NW |
| | Site # 4A ( 5:36 p.m. to 6:37 p.m.) | Patricia Heights. | -1 | 81 | 2 | dark | W |
| | Site # 5A ( 6:49 p.m. to 7:49 p.m.) | Lymburn. | -3 | 88 | 3 | dark | WNW |
| | Site # 2 ( 8:02 p.m. to 9:03 p.m.) | Fort Edmonton. | -5 | 95 | 2 | dark | WSW |
| 30-Nov-00 | Site # 1B ( 6:34 a.m. to 7:35 a.m.) | Riverbend Rd. - light snow. 7:17AM-Westbound traffic backed up on Quesnell bridge. | -5 | 93 | 7 | 100% | E |
| | Site # 2 ( 7:49 a.m. to 8:50 a.m.) | Set out carbotrap #9 (traffic still very slow). | -5 | 93 | 8 | 100% | E |
| | Site # 3 ( 9:01 a.m. to 10:01 a.m.) | Lynwood. | -5 | 93 | 6 | 100% | E |
| | Site # 6B (10:07 a.m. to 11:07 a.m.) | Quesnell Heights. Light snow. | -4 | 87 | 5 | 100% | E |
| | Site # 4 (11:16 a.m. to 12:17 p.m.) | Elmwood. Light snow. | -3 | 85 | 6 | 100% | SE |
| | Site # 5 (12:28 p.m. to 1:27 p.m.) | Primrose. Light snow. | -3 | 81 | 8 | 90% | SE |
| | Site # 1B ( 1:40 p.m. to 2:41 p.m.) | Riverbend. Light snow. Previous hr is result of traffic exhaust | -4 | 84 | 12 | 100% | SE |
| | Site # 6B ( 2:52 p.m. to 3:53 p.m.) | Quesnell Heights. Light snow. Previous hr is traffic exhaust | -4 | 87 | 5 | 100% | E |
| | Site # 3 ( 4:01 p.m. to 5:02 p.m.) | Lynnwood. Light snow. | -4 | 89 | 7 | 100% | SE |
| | Site # 4 ( 5:14 p.m. to 6:15 p.m.) | Elmwood. Lt snow. Set out carbotrap # 10. | -4 | 89 | 4 | 100% | W |
| | Site # 5 ( 6:37 p.m. to 7:38 p.m.) | Primrose. Dark and no snow. | -5 | 91 | 7 | dark | SE |
| | Site # 2 ( 7:48 p.m. to 8:49 p.m.) | John Janzen Centre. Dark and no snow. | -4 | 89 | 5 | dark | SE |

**List of Weather Parameters**

Temp. - ambient temperature in degrees Celcius
RH - relative humidity in percent
WSP - wind speed in kilometers per hour
WDR - wind direction
Cloud - percent cloud cover
V - Variable winds

## Table A13 Weather conditions and operator's observations in Whitemud Drive area survey (January and February 2001).

| Date | Monitoring Location and Time (MST) | MAML Operator's Comments and Observations | Temp. °C | RH % | WSP km/h | Cloud | WDR |
|---|---|---|---|---|---|---|---|
| 10-Jan-01 | Site # 1B ( 6:40 a.m. to 7:41 a.m.) | Light to normal traffic. | -5 | 86 | 7 | 0% | S |
| | Site # 2A ( 7:58 a.m. to 9:09 a.m.) | 1/2 block N of Fox Dri. on Ft. Edm. Rd. Set out carbo traps #11 & 12. Normal traffic movement during the hr. | -7 | 89 | 4 | 0% | SW |
| | Site # 3 ( 9:16 a.m. to 10:18 a.m.) | Stop at site # 3. | -6 | 85 | 3 | 0% | SE |
| | Site # 6B (10:24 a.m. to 11:23 a.m.) | Stop at site # 6B. | -5 | 80 | 6 | 0% | SW |
| | Site # 4 (11:32 a.m. to 12:32 p.m.) | Stop at site # 4. | 0 | 59 | 5 | 0% | SW |
| | Site # 5 (12:43 p.m. to 1:42 p.m.) | Stop at site # 5. | 1 | 55 | 3 | 0% | SW |
| | Site # 1 ( 1:59 p.m. to 3:00 p.m.) | Normal traffic movement. | 1 | 55 | 3 | 0% | SW |
| | Site # 2A ( 3:08 p.m. to 4:06 p.m.) | On approach rd to Ft. Edm. just off Fox Dr. | 1 | 58 | 2 | 0% | SW |
| | Site # 3 ( 4:17 p.m. to 5:26 p.m.) | Start carbo trap sample. | 0 | 65 | 2 | 10% | SW |
| | Site # 6 ( 5:41 p.m. to 6:40 p.m.) | Dark. Light traffic. | -3 | 75 | 2 | dark | S |
| | Site # 4 ( 6:54 p.m. to 7:57 p.m.) | Very light winds. | -4 | 78 | 1 | dark | S |
| | Site # 5 ( 8:07 p.m. to 9:06 p.m.) | Dark. 8:09PM-$NO_x$ readings are from fwy traffic. | -5 | 78 | 1 | dark | S |
| 13-Feb-01 | Site # 1B ( 6:29 a.m. to 7:31 a.m.) | All in sample at site 1B. | -21 | 82 | 3 | 0% | E |
| | Site # 2 ( 7:40 a.m. to 8:44 a.m.) | Set out carbotrap # 14. | -25 | 77 | 3 | 0% | S |
| | Site # 6C ( 8:50 a.m. to 9:49 a.m.) | Laurier Heights. | -18 | 83 | 6 | 10% | S |
| | Site # 3 ( 9:58 a.m. to 10:59 a.m.) | Stop at site # 3. | -14 | 71 | 7 | 10% | SE |
| | Site # 4 (11:16 a.m. to 12:16 p.m.) | Stop at site #4. | -10 | 65 | 7 | 0% | SE |
| | Site # 5 (12:25 p.m. to 1:28 p.m.) | High cloud. Normal traffic. | -8 | 60 | 10 | n/a | SE |
| | Site # 1B ( 1:39 p.m. to 2:40 p.m.) | High cloud. Normal traffic. | -7 | 61 | 14 | 80% | S |
| | Site # 2 ( 2:47 p.m. to 3:49 p.m.) | High cloud. Normal light traffic. | -5 | 56 | 7 | 100% | SE |
| | Site # 6C ( 3:54 p.m. to 4:59 p.m.) | High cloud. Normal traffic. | -7 | 63 | 9 | 100% | S |
| | Site # 3 ( 5:08 p.m. to 6:13 p.m.) | Set up carbotrap #15. | -7 | 66 | 5 | n/a | SE |
| | Site # 4 ( 6:22 p.m. to 7:22 p.m.) | Dark. | -8 | 69 | 8 | dark | V |
| | Site # 6 ( 7:34 p.m. to 8:35 p.m.) | Dark. | -8 | 79 | 5 | dark | S |
| 16-Feb-01 | Site # 6B ( 6:34 a.m. to 7:34 a.m.) | Dark. Light traffic. | -16 | 84 | 3 | 100% | E |
| | Site # 2 ( 7:45 a.m. to 8:54 a.m.) | Set out carbotrap #16. Normal traffic movement. | -16 | 84 | 2 | 100% | SW |
| | Site # 6C ( 9:16 a.m. to 10:20 a.m.) | Stop at site # 6C. | -12 | 68 | 5 | 95% | SW |
| | Site # 3 (10:27 a.m. to 11:27 a.m.) | Stop at site # 3. | -12 | 62 | 5 | 90% | SW |
| | Site # 4 (11:33 a.m. to 12:33 p.m.) | Stop at site # 4. | -9 | 50 | 6 | 20% | SE |
| | Site # 5 (12:43 p.m. to 1:43 p.m.) | Stop at site # 5. | -7 | 41 | 4 | 0% | SW |
| | Site # 1B ( 1:53 p.m. to 3:18 p.m.) | Stop at site # 1B. | -9 | 46 | 9 | 0% | SW |
| | Site # 2A ( 3:24 p.m. to 4:21 p.m.) | Stop at site # 2A on fox drive. | -10 | 51 | 11 | 0% | S |
| | Site # 3 ( 4:29 p.m. to 5:31 p.m.) | Stop at site # 3. | -11 | 55 | 6 | 0% | S |
| | Site # 4 ( 5:52 p.m. to 6:56 p.m.) | Stop at site # 4. | -13 | 68 | 2 | 0% | S |
| | Site # 5 ( 7:05 p.m. to 8:04 p.m.) | Stop at site # 5. | -15 | 70 | 5 | 0% | S |
| | Site # 6C ( 8:23 p.m. to 9:22 p.m.) | Stop at site # 6C. | -16 | 76 | 3 | 0% | S |
| 27-Feb-01 | Site # 1 ( 6:41 a.m. to 7:40 a.m.) | Clear sky but dark. | -9 | 74 | 3 | 0% | S |
| | Site # 2 ( 7:47 a.m. to 8:49 a.m.) | Set out carbotrap tube #18. | -15 | 69 | 2 | 20% | S |
| | Site # 5 ( 9:01 a.m. to 10:00 a.m.) | 40% cloud cover. | -3 | 60 | 8 | 40% | W |
| | Site # 4 (10:12 a.m. to 11:11 a.m.) | Stop at Site #4. | 0 | 52 | 7 | 10% | SW |
| | Site # 3 (11:19 a.m. to 12:18 p.m.) | Stop at Site #3. | 3 | 41 | 8 | 10% | SW |
| | Site # 6C (12:25 p.m. to 1:25 p.m.) | 12:25PM-not sure where $SO_2$ readings are coming from. | 7 | 35 | 6 | 10% | SW |
| | Site # 1 ( 1:36 p.m. to 2:35 p.m.) | Stop at Site #1. | 8 | 34 | 9 | 20% | SW |
| | Site # 2A ( 2:42 p.m. to 3:41 p.m.) | 200m off Fox Dr. on approach road to Ft. Edm. | 9 | 34 | 7 | 10% | SW |
| | Site # 5 ( 3:50 p.m. to 4:50 p.m.) | Stop at Site #5. | 10 | 32 | 5 | 5% | SW |
| | Site # 4 ( 4:59 p.m. to 6:06 p.m.) | Set out carbotrap #19 & 20 (blank) 5:31PM-Reading exh. from fwy traffic. | 8 | 37 | 4 | 0% | SE |
| | Site # 3 ( 6:15 p.m. to 7:16 p.m.) | Stop at Site #3. | 4 | 57 | 1 | 0% | SE |
| | Site # 6C ( 7:22 p.m. to 8:22 p.m.) | 7:23PM-elevated readings but local traffic is very light. 8:00PM-local traffic increasing. | 1 | 70 | 2 | dark | S |

**List of Weather Parameters**

Temp. - ambient temperature in degrees Celcius
RH - relative humidity in percent
WSP - wind speed in kilometers per hour
WDR - wind direction
Cloud - percent cloud cover
V - Variable winds

## Table A14 Weather conditions and operator's observations in Whitemud Drive area survey (April and May 2001).

| Date | Monitoring Location and Time (MST) | MAML Operator's Comments and Observations | Temp. °C | RH % | WSP km/h | Cloud | WDR |
|---|---|---|---|---|---|---|---|
| 18-Apr-01 | Site # 1 ( 5:34 a.m. to 6:34 a.m.) | Stop at Site #1. | 1 | 56 | 7 | 0% | S |
| | Site # 2 ( 6:39 a.m. to 7:49 a.m.) | Set out carbotrap #21. | 4 | 48 | 5 | 0% | W |
| | Site # 3 ( 8:03 a.m. to 9:04 a.m.) | 8:17AM-exhaust may be from city repair crew 1/2 block west. | 12 | 29 | 5 | 0% | W |
| | Site # 6C ( 9:14 a.m. to 10:14 a.m.) | Stop at site #6C. | 17 | 18 | 7 | 0% | SW |
| | Site # 4 (10:25 a.m. to 11:25 a.m.) | Stop at Site#4. | 15 | 17 | 11 | 0% | SW |
| | Site # 5 (11:34 a.m. to 12:33 p.m.) | Stop at Site #5. | 16 | 15 | 9 | 0% | S |
| | Site # 1 (12:45 p.m. to 1:45 p.m.) | Stop at Site #1. | 17 | 15 | 14 | 50% | SW |
| | Site # 2 ( 1:50 p.m. to 2:52 p.m.) | Stop at Site #2. | 16 | 16 | 13 | 60% | SW |
| | Site # 3 ( 3:04 p.m. to 4:12 p.m.) | Set out carbotrap #22. | 17 | 15 | 10 | n/a | W |
| | Site # 6C ( 4:19 p.m. to 5:20 p.m.) | Street sweeper. | 18 | 16 | 7 | 40% | SW |
| | Site # 4 ( 5:29 p.m. to 6:31 p.m.) | Stop at Site #4. | 15 | 18 | 7 | 70% | W |
| | Site # 5 ( 6:38 p.m. to 7:40 p.m.) | Stop at Site #5. | 13 | 25 | 6 | n/a | NW |
| 19-Apr-01 | Site # 1 ( 5:51 a.m. to 6:54 a.m.) | 6:13AM-Exhaust from vehicle close by. 6:20AM-light rain for a few minutes. | 5 | 56 | 15 | 100% | N |
| | Site # 2A ( 7:07 a.m. to 8:08 a.m.) | Start carbotrap #23. | 7 | 56 | 6 | 100% | SW |
| | Site # 3A ( 8:19 a.m. to 9:18 a.m.) | Stop at Site #3A. | 8 | 47 | 11 | 100% | W |
| | Site # 6B ( 9:22 a.m. to 10:24 a.m.) | Stop at Site #6B. | 9 | 44 | 9 | 80% | W |
| | Site # 4A (10:29 a.m. to 11:29 a.m.) | Stop at Site #4A. | 10 | 42 | 14 | 80% | NW |
| | Site # 5A (11:40 a.m. to 12:41 p.m.) | Stop at Site #5A. | 11 | 34 | 16 | 60% | NW |
| | Site # 1 (12:54 p.m. to 1:53 p.m.) | Stop at Site #1. Very lt rain near end of hr. | 12 | 33 | 21 | 70% | N |
| | Site # 2A ( 2:10 p.m. to 3:11 p.m.) | Sunny with periods of light rain. | 11 | 48 | 14 | 70% | W |
| | Site # 3A ( 3:18 p.m. to 4:30 p.m.) | Set up carbotraps #24 & 25. | 10 | 51 | 10 | 90% | W |
| | Site # 6B ( 4:33 p.m. to 5:33 p.m.) | Stop at Site #6B. | 10 | 42 | 9 | 40% | W |
| | Site # 4A ( 5:38 p.m. to 6:38 p.m.) | Stop at Site #4A. | 10 | 39 | 13 | 20% | W |
| | Site # 5A ( 6:48 p.m. to 7:48 p.m.) | Stop at Site #5A. | 6 | 53 | 10 | 5% | W |
| 3-May-01 | Site # 5 ( 5:51 a.m. to 6:51 a.m.) | 6:30 AM-continuous traffic on side St. | 7 | 35 | 4 | 80% | SW |
| | Site # 4 ( 7:10 a.m. to 8:14 a.m.) | Set out carbotrap #26. | 11 | 30 | 4 | 80% | S |
| | Site # 3 ( 8:22 a.m. to 9:20 a.m.) | Stop at Site #3. | 15 | 22 | 8 | 80% | SW |
| | Site # 6C ( 9:29 a.m. to 10:28 a.m.) | Stop at site #6C. | 17 | 21 | 13 | 20% | S |
| | Site # 2A (10:41 a.m. to 11:40 a.m.) | Stop at site #2A. | 17 | 20 | 16 | 0% | SW |
| | Site # 1A (12:02 p.m. to 12:59 p.m.) | Not downwind of fwy but had to get away from burning garbage. | 19 | 18 | 12 | 40% | SW |
| | Site # 5 ( 1:12 p.m. to 2:12 p.m.) | 80% high thin cloud. | 20 | 17 | 10 | 80% | SW |
| | Site # 4 ( 2:22 p.m. to 3:21 p.m.) | Stop at Site #4. | 22 | 16 | 9 | 75% | S |
| | Site # 3 ( 3:29 p.m. to 4:36 p.m.) | Set out carbo trap # 27. | 22 | 16 | 8 | 80% | SW |
| | Site # 6 ( 4:45 p.m. to 5:44 p.m.) | Stop at Site #6C | 22 | 17 | 8 | 70% | SW |
| | Site # 2 ( 5:53 p.m. to 6:54 p.m.) | Stop at Site # 2 | 20 | 18 | 7 | 40% | S |
| | Site # 1 ( 7:01 p.m. to 7:59 p.m.) | Stop at Site #1 | 18 | 20 | 5 | 80% | S |
| 24-May-01 | Site # 1B ( 5:49 a.m. to 6:49 a.m.) | Set out carbotrap #28. | 17 | 42 | 4 | 100% | S |
| | Site # 2 ( 7:01 a.m. to 8:01 a.m.) | Stop at site #2. | 18 | 45 | 3 | 100% | SW |
| | Site # 6C ( 8:05 a.m. to 9:05 a.m.) | Stop at site # 6C. | 19 | 42 | 4 | 100% | W |
| | Site # 3A ( 9:24 a.m. to 10:24 a.m.) | Stop at site #3A. | 21 | 39 | 4 | 80% | W |
| | Site # 4A (10:31 a.m. to 11:31 a.m.) | 11:20AM-Pick up smoke from forest fire at Chisolm. | 23 | 32 | 11 | n/a | W |
| | Site # 5A (11:42 a.m. to 12:42 p.m.) | Area still smoky. 12:27PM-Smoke now very heavy. 12:28PM-Elevated PAH's & $O_3$ suspect due to smoke interference. | 24 | 29 | 13 | 80% | SW |
| | Site # 1B (12:57 p.m. to 1:57 p.m.) | Still smokey. | 27 | 25 | 6 | smokey | S |
| | Site # 2A ( 2:11 p.m. to 3:11 p.m.) | Smokey. Lt rain. 4:55PM-Stopped raining. | 27 | 25 | 11 | smokey | S |
| | Site # 3A ( 3:20 p.m. to 4:20 p.m.) | Set out carbotrap #29 at 3:25PM. Elevated $NO_x$ and PAH during the hr. | 27 | 25 | 7 | smokey | SW |
| | Site # 6B ( 4:29 p.m. to 5:29 p.m.) | Smokey. Lt rain. 4:55PM-Stopped raining. | 25 | 30 | 5 | smokey | S |
| | Site # 4A ( 5:34 p.m. to 6:34 p.m.) | Less smoke in the air. | 23 | 37 | 4 | smokey | S |
| | Site # 5A ( 6:44 p.m. to 7:44 p.m.) | Light smoke still visible. Light rain. | 21 | 46 | 5 | smokey | W |

**List of Weather Parameters**

Temp. - ambient temperature in degrees Celcius
RH - relative humidity in percent
WSP - wind speed in kilometers per hour
WDR - wind direction
Cloud - percent cloud cover
V - Variable winds

# Emissions of Air Toxics From On-Highway Sources in Canada
# Total Benzene - Alberta - *DRAFT*

*Source: Senes Report - Emissions of Air Toxics from On-Highway Sources in Canada - 8 March 2002*