Ambient Air Monitoring

As part of the Environmental Assessment process, the Detroit River International Crossing (DRIC) study team has established two ambient air monitoring stations in the Area of Continued Analysis (ACA), along the existing Highway 3/Huron Church Road corridor. The purpose of the monitoring program is to collect data on the total pollutant concentrations that are routinely observed in the corridor. The monitoring program commenced in September 2006 and will continue until the end of September 2007.

Purpose of Ambient Air Monitoring

The data is being used to:

- establish current conditions within the corridor
- assist in determining background air concentrations of the pollutants being measured
- benchmark the air dispersion modelling.

Station Locations

Suggested locations for each station were obtained from the DRIC Community Consultation Group (CCG). The final locations were selected based on the technical requirements/limitations of the available properties (i.e. site access, power availability, trees) and permissions from the property owners. Both stations are located within 45 m (147 ft) of the edge of the roadway, along Highway 3/Huron Church Road.

The first station was deployed in an open field adjacent to the Ontario Public Health Laboratory, which is located at 3400 Huron Church Road (between Cabana Road and Pulford Street). The second station is located adjacent to 2015 Talbot Road, which is on the south side of the road, approximately at the intersection of Talbot Road and Geraedts Drive, which is the main entrance to St. Clair College. Both locations experience significant traffic. In addition, the station at St. Clair College will experience the effects of idling traffic, as vehicles queue at the intersection. A traffic counting station on Huron Church Road, located in the St. Clair College area will provide continuous traffic counts to correlate with the measurements.

Pollutants Being Measured

Nitrogen oxides (NO_x) and fine particulate matter ($PM_{2.5}$) are generally the typical air pollutant indicator compounds of major concern with regard to transportation related vehicle emissions. Other criteria air pollutants such as carbon monoxide (CO) are also related to transportation sources, but generally are not problematic in terms of health and environmental effects.

A variety of toxic volatile organic compounds (VOCs) associated with vehicle exhaust are also of concern. Four of these have been selected for monitoring. These are:

Benzene
Acrolein *
Formaldehyde *
Acetaldehyde *

The pollutants listed above are those typically associated with diesel powered heavy trucks. Those denoted with an asterisk (*) are believed to be primarily responsible for the characteristic odour of diesel exhaust.

In addition to the air pollutant concentrations, meteorological data will be continuously collected at both stations, such that the data can be correlated with the meteorological conditions. The parameters being measured are:

- Wind speed and direction
- Temperature
- Relative humidity.

Station Operation

The two ambient air monitoring stations are completely automated. The instruments are sheltered in climate controlled trailers and are operated following regulatory procedures and protocols accepted by the Ministry of the Environment (MOE) and the U.S. Environmental Protection Agency (EPA). Most measurements (NO_x, $PM_{2.5}$, and meteorology) are being made continuously on an hourly basis. The air monitors self-calibrate daily, but are checked and manually re-calibrated every two weeks as part of a routine maintenance schedule.

Continuous sampling methods for speciated VOCs are not presently available. Consequently, samples are being collected twice weekly at each location and forwarded to an accredited laboratory for analysis.

Monitoring Methods

Nitrogen Oxides

Nitrogen oxides are a mix of species, including predominantly nitrogen oxide (NO) and nitrogen dioxide (NO_2), in addition to smaller amounts of NO_3, N_2O, N_2O_3, N_2O_4 and N_2O_5. Nitrogen dioxide (NO_2) is the species of importance in terms of health and environmental effects as it can cause acid rain and exacerbate respiratory ailments in humans. Ambient NO_X is being monitored continuously using a chemiluminescence analyzer, which is the U.S. EPA/MOE preferred method. Since all NO_X can potentially be converted to NO_2 in the presence of unlimited ozone, total NO_x is reported as "total NO_x as NO_2".

Fine Particulate Matter ($PM_{2.5}$)

Several different methods are available to measure the fine fraction of particulate matter ($PM_{2.5}$). These are the Tapered Element Oscillating Microbalance (TEOM), the Partisol, and the Beta Attenuation Monitor (BAM). Based on past experience and MOE preference, the DRIC study team has selected BAMs for use in this program. BAMs measure fine particle concentrations via the transmission of beta rays through a special filter tape. Particulate matter is drawn into the sampler at a known flow rate, and deposited on the filter. Each hour the beta transmission is re-measured, and the difference between two measurements is used to determine the air concentration.

Air Toxics

Two samples are being collected weekly at each station for each air toxic included in the monitoring program. Once collected, all samples are transported to an accredited laboratory for analysis. The following table presents the sampling methods used for each pollutant, as well as the expected detection limits.

Table 1: Air Toxics Sampling Methods

Air Toxic	Sampling Method	Detection Limit ($\mu g/m^3$)
Benzene	U.S. EPA TO-15 (SUMMA Canisters)	0.2 (0.05 ppbv)
Acetaldehyde & Formaldehyde	U.S. EPA TO-11A (DNPH sorbent tubes)	1.0
Acrolein	U.S. EPA TO-15 (SUMMA Canisters)	0.1 (0.11 ppbv)

Findings to Date

The results of the monitoring program are being summarized and released to the public on a quarterly basis. To date, results are available for the first half of the monitoring period (i.e. October 2006 – March 2007). Data from the third quarter (April – June) will be available shortly.

The available results for the monitoring period thus far show the following:

- Traffic volumes, particularly trucks, are relatively consistent on a weekly basis.
- There were no exceedances of the MOE AAQCs (1-hr and 24-hr) for NO_x at either station.
- The guideline levels for either of the VOCs (acrolein, benzene) and aldehydes (acetaldehyde, formaldehyde) were not exceeded at any point during the first two quarters of sampling.
- The proposed Canada Wide Standard (24-hr) for $PM_{2.5}$ was exceeded at both stations, a total of 18 days (13 in the first quarter) at OPHL and 12 days (eight in the first quarter) at St. Clair College. These may be attributed to any number of local or transboundary sources in combination with certain meteorological conditions.
    - The average $PM_{2.5}$ concentration at both stations is similar, and remained relatively unchanged between the first and second quarters.
    - The results of the air dispersion modelling indicates that in many cases these exceedances are driven by high background concentrations from other local sources and transboundary air flow.

Next Steps

As outlined above, the monitoring program will continue until the end of September 2007.

A report documenting the third quarter (April – June) is in preparation, and will be released when completed. Once the monitoring program is complete, a summary report will be developed and released that details the trends and correlations seen over the entire monitoring period.