Detroit River
INTERNATIONAL CROSSING
S T U D Y

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 Huron Church/Talbot Rd. corridor. The purpose of the monitoring program is to collect data on the total pollutant concentrations that are routinely observed in the corridor, rather than specifically determine the fraction that originates from the roadway. This information will be useful for the air modelling assessment in that it will firmly establish the baseline air contaminant concentrations in the vicinity of the route. The monitoring program commenced in September 2006 and will continue until the end of September 2007.

Purpose of Ambient Air Monitoring

The data will be used to:

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

The measured concentrations will be compared to relevant federal and provincial Ambient Air Quality Criteria (AAQCs) and standards to assess whether they are presently within acceptable levels. In addition, the monitoring data will be used in combination with air dispersion modelling to determine the contribution from background sources in the area (i.e. Zug Island, other local industries). This background contribution will be added to all modelled results for the assessment of the Practical Alternatives. Also, the data will be used to validate the air dispersion modelling completed for the assessment. This will be done by modelling the existing conditions and comparing the model predicted concentrations (including background) with the measurements for each pollutant. A statistical analysis will then be completed to determine whether the model accuracy is within acceptable levels.

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 Rd. (between Cabana and Pulford). 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_{10} & $PM_{2.5}$) are generally the typical air pollutant indicator compounds of major concern with regard to transportation related vehicle emissions. Other criteria air pollutants such as 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_{10}, $PM_{2.5}$, & 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_{10} & $PM_{2.5}$)

Several different methods are available to measure the fine fraction of particulate matter (PM_{10} & $PM_{2.5}$). 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 team has selected TEOMs (PM_{10}) and BAMs ($PM_{2.5}$) for use in this program. TEOMs measure fine particulate concentrations on an hourly basis through the change in the vibration (or oscillation) frequency of a very sensitive balance. Particulate matter is drawn into the sampler at a known flow rate. As the particulate builds up, the frequency changes, which translates into the air concentration. 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 will be collected weekly at each station for each air toxic included in the monitoring program. Once collected, all samples will be transported to an accredited laboratory for analysis. The table below 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 (µg/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)

Reporting

The results of the monitoring program will be summarized and released to the public on a quarterly basis. The quarterly reports will be submitted with full analysis and interpretation of the data, including correlation with the collected traffic data and meteorology.