ATTACHMENT 1
Revised August 19, 2009
DETAILED COMMENTS

Rational Against Diesel Expansion

Scientific evidence from around the world links air pollution at levels commonly experienced in major urban centres to significant adverse impacts on health. Most affected are people of all ages with underlying respiratory and heart problems. Air pollution is responsible for about 1,700 premature deaths and 6,000 hospitalizations each year in Toronto.

Studies show increased adverse health impacts in close proximity to major transportation corridors and hubs. Diesel exhaust is a key contributor to these observed health effects. It is a complex mixture of particles and gases containing several hundred different organic and inorganic components, including many substances that have been identified as toxic. Short-term exposures to diesel exhaust are associated with irritation of the eye, nose and throat. Longer exposures to diesel exhaust may worsen allergies or cause lung injury. There is increasing evidence that diesel exhaust is associated with the development of various cancers, particularly lung cancer, and in a 2002 report (*Estimated Human Health Risk from Exposure to Diesel Exhaust in Toronto*) Toronto Public Health concluded that diesel exhaust likely contributes to the burden of cancer in Toronto.

Electrically powered vehicles, including electric trains, do not have direct air pollution emissions. In addition to not producing direct emissions, electric trains tend to be more energy efficient, have the potential for greater speed and are less noisy than diesel trains.

Bias in Environmental Project Report

As part of their Environmental Project Report (EPR), Metrolinx commissioned air quality and human health risk assessments of the proposed new and expanded diesel rail service. These assessments clearly identified both adverse impacts on air quality and increased human health risk. Despite this, Metrolinx' summary and discussion of the assessments reinterprets and trivializes these results. The following examples illustrate this:

- In Metrolinx' summary of the EPR (p. 3), Metrolinx states that the impact assessment studies "used a cautious approach, modelling impacts based on worst case scenarios to show that even under extreme weather conditions, with high traffic volumes, the project can operate safely and protect human health and the environment." The review of the EPR and associated technical reports by Toronto Public Health found that a cautious approach was not used in the assessment, and that serious underestimations of air quality and human health impacts were made (see below). Despite these underestimations, the technical reports actually predict considerable air quality and human health impacts.

- Metrolinx' description of the proposed project (p. 1, Executive Summary) states that the diesel expansion will "reduce air pollution and the emission of greenhouse gases (GHGs)." The air quality impact assessment commissioned by Metrolinx shows large increases in air pollution for adjacent communities resulting from the diesel expansion. For example, the contribution to air pollution from the future build scenario is often two to three times larger than from the future no-build scenario. Public transit projects may be expected to improve regional air quality by reducing the number of personal vehicle-kilometres travelled. However, the regional air quality impacts of the diesel transit expansion were not evaluated in a meaningful way (except for the cursory examination of GHG). Road traffic volumes

were not adjusted to account for fewer trips in personal vehicles, so comparisons among the background, future no-build and future build scenarios simply compare no-trains to some-trains to many-trains. Statements of regional air quality benefits are not justified by the current assessment.

- Metrolinx repeatedly states in the EPR and technical reports that the predicted impacts are worst case predictions and would occur only rarely (e.g., p. 419), but as is described below in more detail, the worst case was not really modelled.

Air Quality Impact Assessment Underestimates Air Pollution

The air quality impact assessment commissioned by Metrolinx predicts that local, ambient air concentrations of all the modelled pollutants will increase. The model predicts many cases where the proposed diesel expansion will contribute chemical concentrations approximately equal to or exceeding the contribution from all other sources (i.e., future build contribution ≥ background air pollution levels). The future build scenario contributes more to air pollution than the background levels for the following chemicals:

- 1-hour average concentrations of: $PM_{2.5}$, NO_X, NO_2, SO_2, acrolein, benzene, benzo(a)pyrene, and 1,3-butadiene;
- 24-hour average concentrations of: NO_X, NO_2, benzo(a)pyrene, and 1,3-butadiene; and,
- Annual average concentrations of: NO_2 and benzo(a)pyrene.

The model predicts that the contribution to air pollution from the future build scenario is often two to three times larger than from the future build scenario. The future build scenario contributes at least double the pollution as the future no-build scenario for the following chemicals:

- 1-hour average concentrations of: $PM_{2.5}$, PM_{10}, SO_2, acetaldehyde, acrolein, benzene, 1,3-butadiene and formaldehyde;
- 24-hour average concentrations of: SO_2, acetaldehyde, acrolein, benzo(a)pyrene and formaldehyde; and,
- Annual average concentrations of: SO_2, acetaldehyde, acrolein, benzo(a)pyrene and formaldehyde.

The model also predicts that the 24-hour NO_2 concentrations will exceed the health-protective threshold in one residential area (R57). At every receptor location (44 residential areas, 37 schools, 40 child care centres and 4 long term care centres), the 24-hour acrolein concentration will further exceed the threshold (background concentrations of acrolein already exceed the 24-hour threshold, and the project will add approximately 40% to that burden). Furthermore, predicted 24-hour concentrations of $PM_{2.5}$, PM_{10}, and NO_2 are approaching their respective threshold values at some locations (i.e., predicted concentrations between 90 and 95% of the threshold).

These predictions are all underestimates of the air quality impact of a diesel expansion. More accurate predictions would show higher cumulative chemical concentrations, exceedances for more chemicals and exceedances in more locations. Sources of major underestimation in the air quality impact assessment include:

- The background chemical concentrations in ambient air that were input to the air dispersion model are 90th percentile concentrations from the year between 2002 and 2006 with the worst air quality. Selecting the 90th percentile means that 10% (or more than a month's worth) of samples in the selected year had worse air quality because the top 10% of values in that year were not considered. The 90th percentile concentrations were used to predict cumulative future concentrations, but none of these predictions represents a true worst-case. The peak and average air quality impacts of the diesel expansion may be much higher than predicted because peak background concentrations were not captured.

- The air quality impact assessment compares 90th percentile predictions of 24-hour $PM_{2.5}$ concentrations to an air quality threshold that is intended to be compared to 98th percentile concentrations. The 90th percentile predicted concentrations under the future build scenario approach but do not exceed the threshold value (85 to 98% of the value at all receptor locations). If the analysis was repeated with an appropriate comparison of 98th percentile predictions to the threshold, then excess risk due to $PM_{2.5}$ exposure would be probably predicted at many of the receptor locations.

- The air dispersion modelling does not account for several significant sources of non-project related local air pollution, including Highway 401, which crosses the study corridor, and light industry in adjacent neighbourhoods. Furthermore, elements of the project are also excluded from the air dispersion model. For example, the section of the Barrie line where it branches off from the Georgetown Line (and the additional train traffic on that line of up to 79 new trains per day) is not modelled as an emissions source. In addition, the proposed Eglinton GO Station and Mobility Hub is excluded from the project and not modelled. Inclusion of these sources in the air dispersion model would result in higher estimates of air pollution in the background and future build scenarios.

Under Representation of Health Risks

The human health risk assessment commissioned by Metrolinx predicts increased acute health risks and increased cancer risk from the diesel expansion. Increased risk of respiratory irritation during peak air pollution events is predicted in one residential area (R57) when NO_x alone is considered. Increased risk of eye and throat irritation, and decreased respiratory rate from acrolein exposures during peak air pollution events is predicted at every receptor location (44 residential areas, 37 schools, 40 child care centres and 4 long term care centres). When the mixture of respiratory irritants (acetaldehyde, acrolein, formaldehyde, NO_x, $PM_{2.5}$ and SO_2) is considered together, increased risk of respiratory irritation during peak air pollution events is predicted at every receptor location.

Unacceptable risks of leukemia (i.e., incremental lifetime risks in excess of the 1-in-1 million *de minimus* cancer level specified by the Ontario Ministry of the Environment) (ranging from 1.2- to 1.5-in-1 million) due to exposures to 1,3-butadiene are predicted for 12 residential areas (R6, 7, 9, 10, 22, 25-27, 37, 41-43). When both 1,3-butadiene and benzene are considered together, unacceptable risks of leukemia (ranging from 1.1- to 2-in-1 million) are predicted for 16 residential areas (R6, 7, 9, 10, 22, 25-27, 37, 40-43, 52, 56, 119).

Although these cancer risks predicted in the Metrolinx studies are of concern, they underestimate the true health risk of the diesel expansion. Sources of major underestimation in the human health risk assessment include:

- The human health risk assessment was based on predicted ambient air concentrations that were underestimated (see above). Every prediction of human health risk is underestimated as a consequence, and none of the predictions represent a true worst case scenario.

- Only some of the many components of diesel exhaust were selected for assessment. Diesel exhaust is comprised of several hundred different chemical constituents, many of which have known toxic effects. Among the components of diesel exhaust not assessed are ultrafine particulate matter ($PM_{0.1}$), various metal compounds, ethylene dibromide and many more. No rationale is provided for failing to consider the other components of diesel exhaust (except for metals which are removed from consideration as a group based on one study with relatively high detection limits). If more of the components of diesel exhaust were assessed, additional risks, affecting more people are likely to be predicted, and the risk estimates for chemical mixtures would be higher.

- The human health risk of diesel exhaust can be assessed as a whole. In this way, all of the components of diesel exhaust can be considered and the health risk is not underestimated by ignoring the toxicity of some individual components. The human health risk assessment did not assess diesel exhaust as a whole, even though data are available to do so:

    - In their 2002 *Health Assessment Document for Diesel Engine Exhaust*, US EPA established a threshold value for chronic non-cancer respiratory effects (other than cancer) of 5 $\mu g/m^3$ of diesel particulate matter. A rudimentary comparison of this threshold to the annual average $PM_{2.5}$ and PM_{10} predictions suggests that this threshold would be further exceeded at every receptor location (background concentrations of $PM_{2.5}$ and PM_{10} are already higher than 5 $\mu g/m^3$, and the project may add approximately 10% to that burden).

    - While an older assessment by CalEPA (*Part B: Health Risk Assessment for Diesel Exhaust*, 1998) was able to recommend a unit risk for whole diesel exhaust of 6×10^{-4} (μg diesel particulate matter/m^3)$^{-1}$, in 2002 US EPA determined that the available data were not adequate to derive a unit risk value for the carcinogenic effects of diesel exhaust as a whole. However, US EPA did conduct "simple exploratory analyses … to provide a perspective of the range of possible lung cancer risk from environmental exposure to [diesel exhaust]." While not suitable for quantitative estimation of the population risks under specific exposure scenarios, this perspective could have been used to provide a sense of the upper limit of cancer risk from the proposed diesel expansion. This upper limit would likely be higher than the estimations in the assessment of cancer risk due to single components of diesel exhaust.

- The age dependent adjustment factors (ADAFs) recommended by US EPA in the 2005 *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens* for use in assessments of mutagenic carcinogens where an age-specific slope factor is not available were not used. Application of these factors would increase the reported cancer risk estimates by 1.6-fold. For example, the already unacceptable leukemia

risks from the combined effects of benzene and 1,3-butadiene that are predicted for 16 residential areas would increase to 1.8- to 3.2-in-1 million. Additional, unacceptable cancer risks would also be identified. For example, an unacceptable risk of nasal cancer (1.1-in-1 million) would be predicted in three residential areas (R6, 9, 27) had the ADAFs been used.