TORONTO

STAFF REPORT
ACTION REQUIRED

Reporting on Air Pollution from Airports

Date:	May 29, 2008
To:	Board of Health
From:	Medical Officer of Health
Wards:	All
Reference Number:	

SUMMARY

Emissions from air transportation contribute to air pollution in Toronto. Two local airports affect Toronto's air quality: Toronto City Centre Airport, and Toronto Pearson International Airport.

Toronto Public Health previously reported on Toronto's air pollution burden of illness from all sources, and more recently on the air pollution burden of illness from vehicle traffic. However, lack of available data and limitations in available methods prevent Toronto Public Health from carrying out a valid burden of illness calculation for airport emissions.

Airport authorities have used human health risk assessment methods to evaluate the health risk from total air pollution levels at or near an airport. A comprehensive air quality assessment was carried out by the Greater Toronto Airports Authority in 2004, allowing Toronto Public Health to evaluate the health risk of air pollution near Pearson International Airport. It is not possible to evaluate the health risk of air pollution from the Toronto City Centre Airport because a comprehensive air quality assessment has not been undertaken.

More information about the air quality near each airport and sources of air pollution in the areas around each airport would improve Toronto Public Health's ability to comment on health risks from air pollution in nearby communities.

Compared to trains and buses, planes use more fuel and emit more carbon dioxide per passenger for a given distance travelled. Although air travel outside Toronto by City staff is not common, there may be opportunities to reduce transportation-related emissions from staff travel. A City policy could provide clear guidance on selecting the most environmentally friendly option for staff travel.

RECOMMENDATIONS

The Medical Officer of Health recommends that:

1. the Board of Health request the Toronto Port Authority and the Toronto City Centre Airport to undertake, in consultation with the Medical Officer of Health, Transport Canada, the Ontario Ministry of Environment and Environment Canada, an airport ambient air monitoring program which includes assessment of nitrogen oxides, sulphur oxides, carbon monoxide, particulate matter, and volatile organic compounds, particularly acrolein;

2. the Board of Health request the Greater Toronto Airports Authority to repair their existing onsite monitor and maintain the Airport ambient air monitoring program for at least 15 years to assess the potential air quality impacts associated with changes in Toronto Pearson International Airport operations;

3. the Board of Health request the Ontario Ministry of the Environment to conduct airshed studies of the areas around Toronto Pearson International Airport, and Toronto City Centre Airport, including community-based air monitoring and developing an emissions inventory for the community surrounding each airport;

4. the Board of Health request the Medical Officer of Health to report back on any new air quality-related information and improvement measures at the Toronto City Centre Airport or Toronto Pearson International Airport in June 2009; and

5. the Board of Health encourage the Director of the Toronto Environment Office to explore the development of a corporate travel policy that takes environmental impacts into account, including air pollutant and greenhouse gas emissions.

Financial Impact

There are no financial implications arising from the adoption of this report

DECISION HISTORY

The report *Air Pollution Burden of Illness from Traffic in Toronto Problems and Solutions* was presented to the Board of Health on November 12, 2007. In response, the community group CommunityAIR made four recommendations about how to reduce air pollution from air travel. The Medical Officer of Health was asked to explore the feasibility of a report on air pollution generated by the Toronto City Centre Airport and Toronto Pearson International Airport, and to report back on CommunityAIR's recommendations (See Attachment 1).

ISSUE BACKGROUND

Exposure to air pollution is associated with ill health. The mix of air pollution present in cities is linked to premature mortality, cardiovascular effects, and respiratory effects including reduced lung function, asthma, and chronic obstructive pulmonary disorder. Some of the pollutants in Toronto's air are known carcinogens.

Toronto Public Health has estimated the health impacts of air pollution in the past. The health impact of air pollution from all sources was evaluated in 2004, and the health impacts of air pollution from vehicles were evaluated in 2007. The release of the 2007 traffic and health report raised questions about whether burden of illness studies could address the health impacts of air pollution from airports.

Airports contribute to air pollution in Toronto. The pollution that comes from airports is similar to the pollution from other important sources in the city such as traffic, industrial activity, and fuel that is burned to heat homes and commercial buildings. The air pollution mix typically includes carbon monoxide (CO), particulate matter (PM), nitrogen oxides (NO_x), volatile organic compounds (VOCs), ground level ozone, and other toxic pollutants.

Two local airports directly affect Toronto's air quality: Toronto City Centre Airport (TCCA) and Toronto Pearson International Airport. TCCA is located on the Toronto Islands and handled 90,200 landings and take-offs in 2007. Most of the planes operating from TCCA are small: it is used mainly for privately owned airplanes, small charters, and emergency flights. There have also been some commercial flights from TCCA and in 2006, Porter airlines began operating flights using 70-seat turboprop aircraft on the assumption that a maximum of 600,000 passengers could use TCCA by 2011. Pearson Airport is located in Mississauga, close to the intersection of Highway 401 and Highway 427. It is Canada's busiest airport, handling 424,700 takeoffs and landings and 31.5 million passengers in 2007. Pearson Airport mainly handles large planes, which are used to travel longer distances.

COMMENTS

Calculating how much air pollution is produced at an airport is complex. Air pollution comes from many different sources at airports, including aircraft engines, ground support equipment, service vehicles, and fire training activities. Aircraft maintenance including washing and cleaning, general airport maintenance, and construction activities are also sources of air pollution. Fuel storage tanks, refuelling, and de-icing also release pollutants to the air. As well, traffic bringing passengers to the terminals is a source of air pollution. Each source emits different amounts of pollutants, at different times and frequencies. The total amount of air pollution created on airport property depends on the level and type of activities taking place at the facility and can vary over the course of each day, month, and year.

Because emissions sources at airports are so varied, the total amount of pollution generated at an airport cannot be measured directly. It must be estimated based on information about the activities that occur at the airport. For example, the amount of pollution generated by a ground support vehicle can be calculated based on the type of vehicle, grade of fuel, number of hours the vehicle was operated each day, and speeds at which the vehicle travelled.

Once the total amount of pollution emitted from an airport is estimated, more work is then needed to predict the pollution's health impacts. The health impact depends on how the pollution travels away from the airport, how many people live nearby, and the potential health effects associated with exposure to the different pollutants. Knowing the amount of air pollution from the airport alone is not enough, since people are exposed to a mix of pollutants from all sources. A complete assessment needs to include data from sources outside the airport.

Public Sources of Information about Air Pollution at Airports

The detailed information required to estimate the amount of air pollution generated at an airport is not normally collected or made available. Air quality information about airport activities may be gathered through any applicable environmental assessment (EA) process (as part of the assessment, or any required subsequent monitoring). As well, information about total air pollution levels near airports can be obtained from air quality monitoring data.

Environmental Assessments:

Environmental assessment is a process to identify and address the environmental effects of proposed initiatives before they are carried out. The type and complexity of the EA depends on the specific project. For example, most projects that are subject to the Canadian Environmental Assessment Act undergo a screening assessment to determine whether further review is needed. Only a few projects need a comprehensive review.

At airports, EAs may be required under federal legislation. For any proposal, the EA typically focuses narrowly on the impacts associated directly with the project. Changes in air quality from the proposed project are normally considered, but the broader issue of overall air quality around the airport property is often beyond the scope of the EA.

For Pearson Airport, the Greater Toronto Airport Authority (GTAA)'s environmental policy states that all projects undergo an environmental assessment at least equivalent to Canadian Environmental Assessment Act compliance, even if a federal assessment is not technically required. However, voluntary assessments are not recorded within the Federal Government's registry system and may not always be accessible to the public. At TCCA, an environmental assessment was conducted in 1998 (and updated in 2003) for the proposed fixed link, and another was done in 2006 for the construction of the passenger ferry terminal.

Air monitoring:

Air quality monitors track the total concentration of specific pollutants in the air. The data they collect gives a sense of the overall quality of the air in the area. There is one permanent air quality monitor located close to Pearson Airport, which measures ambient levels of common air pollutants and some volatile organic compounds. There is no permanent air quality monitor located close to TCCA.

The air quality near TCCA or Pearson Airport is a combination of emissions from the airport and non-airport sources. Pollution can come from nearby commercial areas, residential areas, industrial areas, or highways. It is difficult to know what proportion of the pollution measured at an air quality monitor comes from any one source. Air monitoring data can be used to describe air quality near an airport or confirm estimates of pollution generated at an airport, but cannot be used to estimate the amount of air pollution produced at the airport.

Air Quality at Pearson Airport

Airports can commission special studies to assess air pollution impacts. Between 2000-2003, consultants carried out a five-phase, multimillion dollar air quality assessment for Pearson Airport. This research was commissioned by the GTAA at the request of the airport's noise management committee. The study might be viewed as an example of best practice for airports with respect to comprehensive air quality assessment. It included emissions estimation, dispersion modelling, air monitoring, and human health risk assessment. A multistakeholder advisory committee which included representatives from Toronto Public Health and Peel Health provided input on the assessment.

In 2004, the Medical Officer of Health informed the Board about the findings of the human health risk assessment component of the study. The human health risk assessment concluded that nitrogen dioxide, carbon monoxide and acrolein (a carbonyl compound) sometimes exceed acceptable risk levels. The Board made several recommendations relating to monitoring, inventories, and emissions reduction activities (see http://www.toronto.ca/legdocs/2004/minutes/committees/hl/hl041018.pdf).

The Board asked the GTAA to implement ongoing measures to reduce on-site nitrogen oxide emissions. The airport has reduced the number of vehicles owned, the size of vehicles purchased, and invested in electric and hybrid vehicles. An inter-terminal train replaced the shuttle buses that used to move people between terminals. Because new federal regulations reduce the amount of emissions allowed from new diesel vehicles, emissions from the airport's fleet of diesel vehicles will continue to decline as new, less polluting diesel vehicles replace older ones.

Planes emit large amounts of pollution while waiting to take off. Since 2005, operational changes were made and new runways and taxiways were designed to reduce the amount of time planes spend queuing and taxiing. The airport is also installing electric power

sources at airport gates, which reduces emissions by allowing airplanes to run appliances such as air conditioners without using their engines.

The Board also recommended that the National Air Pollutant Surveillance Program institute a monitoring program for carbonyl compounds, in particular acrolein. Staff at Environment Canada indicate that it will soon start to measure acrolein concentrations at the monitor closest to Pearson Airport.

The Board also requested increased air monitoring on GTAA property. In 2005-2006, the GTAA and Transport Canada carried out a fourteen-month study to monitor air quality on airport property. Using a mobile monitoring station, the concentrations of the main criteria air pollutants and about 140 volatile organic compounds were assessed. The study created a database of information that could be used for future air quality research about airports, and concluded that emissions from sources outside airport property strongly affect pollution levels at the airport.

Air Quality at TCCA

The Board last addressed air quality at TCCA in 2002. (See http://www.toronto.ca/health/pdf/boh_centre_airport.pdf.)

Two reports assessing the viability of the TCCA under various operating scenarios included evaluations of air quality. In 1991 the consultants KPMG evaluated six future scenarios and concluded that emissions from operations at TCCA should not result in "undesirable air quality" during the planning horizon (until 2010). In 2002, Sypher:Mueller outlined three options for future operations at TCCA: baseline, enhancement of turboprop services, and introduction of jet services. Both reports concluded that pollution from the Gardiner Expressway overwhelmed any emissions coming from the airport. Neither report estimated the health risk arising from airport emissions alone.

The EAs that were conducted for the proposed fixed link and the proposed ferry transfer facility also addressed air quality. The EA for the proposed fixed link concluded that emissions from aircraft using the airport are comparable to those from the Gardiner, but due to wind patterns, nobody would be exposed to emissions from both sources at once. The EA for the ferry transfer facility evaluated only changes in vehicle traffic to the airport and concluded that total emissions will decrease because more people will drive fuel-efficient vehicles. The focus of each EA was on the design, construction, and operation of the facility. Neither fully addressed the complicated issue of combined emissions from ground traffic, aircraft, transit, and parking or the cumulative impacts of all sources in the neighbourhood.

Feasibility of a Report on Air Pollution from Airports

The process that was used to estimate the burden of illness from traffic is not suitable for estimating the burden of illness from airports. To isolate the impacts of air pollution from

vehicles, Toronto Public Health calculated the health impact of emissions from vehicle traffic in the City. The amount of air pollution from vehicles was estimated using traffic count and flow data, provincial vehicle classifications, and Environment Canada emissions factors. Toronto Environment Office used that information to calculate how much of the City's air pollution comes from vehicle tailpipes. The traffic and health report also relied on a Health Canada tool called AQBAT (Air Quality Benefits Assessment Tool) to predict the health and economic impacts associated with the pollution.

Toronto Public Health does not have access to the information about airport operations that is needed to estimate the amount of pollution coming from the airport. More generally, pollutant emissions from aircraft are not well-known and could not be included. As well, AQBAT is designed for a city-level analysis. Air pollution from airports is concentrated in specific neighbourhoods, but scientists at Health Canada indicate that AQBAT is not well-suited to neighbourhood-level analysis.

However, the airports have direct access to their own operations data, which allows them to model most emissions from their property. An airport authority can use a combination of modelling and monitoring to carry out a comprehensive air quality study and human health risk assessment. Such an assessment would consider total air pollution concentrations near the airport. Human health risk assessments predict whether concentrations of each air pollutant exceed acceptable levels, as well as where and when this might occur.

A comprehensive air quality assessment that evaluates current and projected future operating conditions could characterize the air pollution from TCCA, and assess whether it poses a human health risk. Because of the type of data needed to estimate airport emissions, the Toronto Port Authority is the natural lead for a similar assessment of air quality around the TCCA.

The health impacts of air pollution in the communities close to each airport depend on the total amount of air pollution that reaches people living or working there. Both TCCA and Pearson Airport are close to non-airport sources of air pollution. More information about these sources and overall air quality near the airports would improve Toronto Public Health's ability to assess whether air pollution is a health concern for the surrounding community. This is particularly true for TCCA, since no air quality monitoring has been done in the area.

Air monitoring and an inventory of air pollution sources are key elements of airshed studies. The Ontario Ministry of the Environment should be encouraged to carry out an airshed study for the areas around each airport to identify the main sources of nitrogen oxides, carbon monoxide, particulate matter and carbonyl compounds, particularly acrolein, and to assess the contributions and impacts each source.

The airports should also be encouraged to carry out their own monitoring. Onsite monitoring data can be used to track air quality at the airport over time, and to evaluate

the impacts of any changes in airport operations. Mobile monitoring can be used to determine where the concentrations are highest on airport property, and where best to site a permanent monitor. The GTAA's temporary monitoring study is an example of best practice for air quality management at airports. The GTAA also owns a stationary air quality monitor that can measure several pollutants, including coarse particulate matter, nitric oxides, sulphur dioxide, ozone, carbon monoxide, and several air toxics. However, the monitor is currently out of order (Randy McGill, pers. communication). The GTAA should be encouraged to repair it and monitor air pollution on airport property for at least 15 more years to determine how recent changes in airport operations will affect air quality. The Toronto Port Authority should be encouraged to implement and maintain an onsite air quality monitoring program to measure concentrations of a similar set of pollutants.

Response to CommunityAIR's Recommendations

The community group CommunityAIR made four recommendations to the Board about air travel-related air pollution:

1. Include emissions from traffic in the air when studying the impact on health

As stated above, it is not possible for TPH to isolate the burden of illness due to air pollution from airports alone. When TPH estimated the burden of illness from ambient air pollution in Toronto in 2004, the impacts represented the combined contribution of all sources in the City, including airports.

2. Require the Toronto Port Authority to report on the emissions from all aircraft using its airport

CommunityAIR asked the City to require the Toronto Port Authority to report on emissions from all flights using the TCCA. The City does not have the legal authority to require the Toronto Port Authority to report on the emissions from all aircraft using TCCA.

3. Invest in rapid public transportation from the downtown to Pearson Airport

CommunityAIR asked the City to invest in rapid public transportation between downtown and Toronto Pearson International Airport to reduce road traffic related to airport use. City Council endorsed the concept of a rapid transit connection between Toronto Pearson International Airport and Union Station in 1998, and reaffirmed its position in December 2005. A proposal to develop a direct rapid passenger rail service between Union Station and Pearson Airport is currently undergoing an environmental assessment.

As well, the Toronto Transit Commission endorsed the Toronto Transit City – Light Rail Plan in March 2007. The $6 billion plan includes an Eglinton crosstown route that reaches Pearson Airport.

4. Encourage use of bus and train travel for trips to Ottawa and Montreal especially by City of Toronto staff

Informal estimates by staff indicate that travel to Ottawa and Montreal is not commonplace.

Compared to trains and buses, planes and single occupancy automobiles use more fuel and emit more carbon dioxide per passenger for a given distance travelled. Short-haul flights (less than 1000 km) are associated with higher emissions per kilometre travelled than longer flights because the landing/take off cycle is associated with increased emissions. The landing/take-off cycle also makes up a large part of short-haul flight time.

Current corporate policies for travelling on city business do not consider the environment. The current policy for reimbursement is designed to minimize direct costs of transportation and accommodation. Trips to Montreal and Ottawa by bus or train are typically cheaper than flights. However, because of the increased travel time, bus and train trips require more compensable employee hours and increase accommodation costs.

As part of the City's effort to address climate change and air quality it would be helpful to have clear guidance on selecting the most environmentally friendly option for staff travel.

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SIGNATURE

Dr. David McKeown
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ATTACHMENTS

Attachment 1: CommunityAIR's recommendations to the Board of Health (November 9, 2007)

CommunityAIR - ***devoted to restoring the lands and harbour now occupied by the Toronto Island airport to park, recreation, and cultural uses.***

Deputation to Toronto Board of Health

November 12, 2007

Item 9.1 Air Pollution burden of illness from Traffic in Toronto

Dear Members of the Board of Health:

On behalf of CommunityAIR we would like to bring the following to your attention:

a) Not all the traffic is on the ground. The scope of your study of traffic should include air pollution from aircraft flying out of Toronto City Center Airport (TCCA), and Pearson.

b) The Board of Health needs to include the pollution contributions of these flights.

c) From the attached materials, short haul flights particularly add significantly to the Toronto Air Shed

d) These emissions are occurring, at TCCA, in the most densely populated part of our city and country.

e) Presently there are 207 commercial flights per week from TCCA with 4 Q400 planes in operation. With announced plans to increase this number to 20, the number of flights could exceed 1000 flights per week. The resultant pollution load in downtown Toronto from traffic in the air will be much more significant.

f) Surface traffic in the form of cars, taxis and buses bringing passengers to and from this terminal also need to be considered in the Board of Health's analysis.

g) Porter passenger loads are not high, from our observations. A partially loaded plane at TCCA means the pollution per passenger/kilometre is much larger.

Recommendations:

1. The Board of Health include emissions from traffic in the air when studying impact on health.

2. The City of Toronto require the Toronto Port Authority to report on the emissions from all aircraft using its airport.

3. To reduce road traffic, The City of Toronto invest in rapid public transportation from the downtown to Pearson airport.

4. The City of Toronto encourage use of bus and train travel for trips to Ottawa and Montreal especially by City of Toronto staff.

Sincerely

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Working towards a clean, green waterfront

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