Background
Unionized employees of the City of Toronto, Ontario, Canada, were on strike from June 22 to July 30, 2009. Approximately 24,000 staff from Locals 416 and 79 of the Canadian Union of Public Employees including staff from Solid Waste Management (SWM) and Toronto Public Health (TPH) walked off the job, leaving much of the city without garbage pick up and without many other public services. Management and nonunion staff from Healthy Environments in Toronto Public Health performed daily inspections, responded to community questions, issued public health orders, and worked closely with Solid Waste Management and the Ministry of the Environment to actively manage the public health concerns associated with these sites. This intensive oversight mitigated public health risks to the community and facilitated an effective, safe solution to the temporary garbage storage problem.

Abstract
In 2009, the City of Toronto, Ontario, Canada, experienced a six-week labor disruption involving 24,000 city workers that included solid waste and public health employees. In an attempt to control illegal dumping and to manage garbage storage across the city during this period, 24 temporary garbage storage sites were established by the city (mostly in local parks) for residents to dispose of their household waste. No other municipality in North America has attempted to operate this many temporary sites for this long a period. Management and nonunion staff from Healthy Environments in Toronto Public Health performed daily inspections, responded to community questions, issued public health orders, and worked closely with Solid Waste Management and the Ministry of the Environment to actively manage the public health concerns associated with these sites. This intensive oversight mitigated public health risks to the community and facilitated an effective, safe solution to the temporary garbage storage problem.

Operation and Collaboration
Based on experiences during the 2002 City of Toronto labor disruption, the major concern entering the 2009 strike was the accumulation of illegally dumped garbage. At the start of the strike, TPH set out criteria for determin-
ing whether illegal garbage was a health hazard, as defined under the Ontario Health Protection and Promotion Act (HPPA, 1990). Three conditions were considered as follows: 1) a garbage accumulation larger than 10 cubic meters with extensive exposed garbage that has or is likely to attract flies and rats, 2) any accumulation with evidence of a significant active fly or rat infestation, and 3) illegal dumping near sensitive populations (daycare facilities, hospitals, long-term care facilities). Garbage accumulations meeting any of these criteria could be subject to as defined under the Ontario Health Protection and Promotion Act (HPPA, 1990). Three conditions were considered as follows: 1) a garbage accumulation larger than 10 cubic meters with extensive exposed garbage that has or is likely to attract flies and rats, 2) any accumulation with evidence of a significant active fly or rat infestation, and 3) illegal dumping near sensitive populations (daycare facilities, hospitals, long-term care facilities). Garbage accumulations meeting any of these criteria could be subject to removal.

The labor disruption was a challenging experience for management and nonunion staff. The Healthy Environments section of TPH has a large number of responsibilities that increase in summer due to seasonally influenced work assignments such as heat alerts, West Nile virus, pool inspections, rabies calls, and special events. During the strike, services were reduced to essential operations only. In the case of the temporary dump sites, the managers (all certified and experienced public health inspectors) reviewed whether pest and odor control had been applied the night before at these sites, monitored for the presence of rodent and fly activity, and noted the general conditions (exposed garbage, standing water, etc.). MOE was responsible for ensuring that the pesticides were used according to pertinent regulations and requirements. No testing for pesticides was done during the labor disruption by TPH or MOE, although SWM did some testing after the sites were cleaned up to ensure no residual contamination occurred.

Managers met each morning with the director and provided an update of their sites with any recommendations. Having managers continuously inspect the same sites allowed for evaluation of the sites’ conditions over time. This consistency provided stronger evidence if and when an order to allow pest control was needed. While all of the managers inspected the sites, one manager took the lead in writing and serving all the orders to the City of Toronto.

To facilitate the communication between SWM and TPH, a daily teleconference was held to provide an update of any issues at the temporary garbage sites. A log of sites that did not receive pest control treatment the night before due to picketing was maintained as evidence to inform the need for orders. Daily information from the SWM and the managers’ teleconferences was then passed on to the MOH so that he could be briefed for any meetings or media requests in the afternoon.

Throughout the strike, TPH had additional meetings with SWM and the pest control company to review their practices. Sites were initially assessed daily and sprayed if required. Spraying took place after hours (9 p.m. to 7 a.m.) when the sites were closed to the public and was postponed in windy or wet weather conditions. Toward the end of the strike some sites began requiring increased odor and fly control. With one application already occurring at night, the second spraying would have to be done during the day. This was possible at full sites closed...
to the public, but open sites would have to close for 1–2 hours for this to occur. Daytime spraying was not possible at sites located next to publicly used areas. TPH continued to ensure that spraying was carried out in a manner that was protective of public health.

During the strike, TPH had twice-weekly teleconferences with MOE to share any issues of mutual interest regarding the sites. Nearing the end of the strike, TPH worked closely with SWM and MOE to approve a remediation plan for the dismantling of the temporary garbage sites. TPH made recommendations on the clean-up process, testing, and soil remediation, and continued to inspect the sites while this occurred.

**Evaluation of Health Hazards**

The associate medical officer of health (AMOH) for Healthy Environments provided the technical review of the health risks of the sites. While no scientific literature on temporary garbage sites was identified, a number of potential health hazards have been associated with municipal landfill sites, including ground water pollution, air pollution, emissions of toxic chemicals, and animal vectors of disease (Hamer, 2003; Rushton, 2003; Vrijheid, 2000). While many of these risks did not apply to temporary garbage sites, this framework of possible hazards provided the basis for evaluating potential risks and implementing risk management strategies to prevent them.

**Water Pollution**

Temporary garbage sites were mostly located on hard surfaces with covered catch basins to prevent runoff from entering the water system. Absorbent material was placed around the sites to prevent runoff from entering the soil and percolating into ground water or surface water. Even if a small amount of surface water contamination had occurred, the City of Toronto is fully supplied by municipally treated water. The source of the water is Lake Ontario and the intakes are as far as 5 km offshore. Treatment of drinking water would further minimize some of the potential public health risks associated with the runoff. Public beaches were monitored on a daily basis for *E. coli* and posted per our usual protocol. We assumed that bacterial counts would act as an indicator for leachate from the temporary garbage sites.

In Toronto, surface water runoff is associated with high *E. coli* counts and the leachate would be in surface water runoff.

**Emissions of Toxic Chemicals**

In dry weather conditions a number of the sites had small pools of leachate around the garbage piles. Due to the physical design of the sites and added barriers such as absorbent booms and socks around the perimeters, the liquid was contained within the sites where it could be removed and disposed of at the end of the strike. As Toronto experienced a number of heavy rains during the six-week labor disruption, concerns arose of contaminated runoff from the sites into surrounding areas. (See photo above.)

A significant body of literature exists on the contaminants of landfill leachate (Kjeldsen et al., 2002; Slack, Gronow, & Voulvoulis, 2004). This literature assumes, however, that a certain amount of household hazardous waste has undergone several phases of decomposition in the landfill. Residents were asked to limit their dropped-off garbage to appropriate waste, but items such as vacuum cleaners were seen dumped in the sites. With a small amount of hazardous waste, the main chemicals of concern would be heavy metals and xenobiotic organic compounds such as aromatic hydrocarbons and phenols (Kjeldsen et al., 2002). Products such as a discarded battery would still have to degrade in order
to release its chemicals into the leachate. It is very difficult to estimate to what degree this would have occurred given the above-ground and short-term storage of the garbage. It is also unknown how much leachate was in the rainwater runoff that left the sites.

Three potential routes of exposure are possible for this type of contamination: ingestion of the soils (pica in children), ingestion of food grown in the soils, and inhalation of toxic dust particles (Domingo & Nadal, 2009). Contamination of groundwater is another possible route, but is irrelevant in Toronto, as discussed above. Most of the potentially contaminated soils were not in areas where children or adults would play, and those that were underwent soil remediation. Several sites had nearby community gardens, but none were in locations that received runoff water.

Animal Vectors of Disease
The main pests of concern were flies and rodents. Flies are attracted to open garbage for the readily available food source it provides. Certain types of flies will move from this contaminated environment to a noncontaminated environment, thereby mechanically transmitting pathogens (Graczyk, Knight, Gilman, & Cranfield, 2001; Greenberg, 1973). It has been shown that flies can transfer many human gastrointestinal illnesses in this way, such as salmonellosis, shigellosis, and cholera (Khalil, Lindblom, Mazhar, & Kaijser, 1994; Levine & Levine, 1991; Olsen & Hammack, 2000). Flies are able to transmit protozoal illness and can carry over 100 individual Cryptosporidium oocysts at a time. Fly transmission of illness is typically interrupted in urban environments by preventing flies from entering and contaminating food and food surfaces (Bonneyfoy, Kampen, & Sweeney, 2008).

Rats can carry a variety of diseases that can be transmitted to humans (Nowak, 1999). They can also be host to various ectoparasites such as fleas and lice that can then be spread to humans (Webster & Macdonald, 1995). Disease can be spread from rodents by direct transmission or by aerosolization over short distances (Bonneyfoy et al., 2008).

Removal of Garbage
TPH worked closely with SWM, MOE, and the pest control company to ensure that the identified health hazards were appropriately mitigated and that the sites were well-managed. Despite best efforts to maintain the temporary dump sites, the awareness was always present that a point could be reached when they were no longer being effectively managed and that removal of the garbage would be necessary. Much debate occurred within TPH regarding the criteria that would be used to determine when these piles of garbage had become a health hazard. Evidence of significant infestation despite adequate pest control was considered as a criterion, but proved difficult to quantify and standardize. Other factors, such as leaking of leachate and general maintenance, were also considered, but the strike ended before definitive criteria were set.

Community Concerns—“Not in My Backyard”
The purpose of the temporary garbage sites was to provide accessible locations throughout the city for local residents to be able to deposit their household waste during the labor dispute. Most of the locations were in parking lots or outdoor ice arenas of city parks, with some being closely situated to playgrounds or backyards. Toronto has a large number of community parks that are heavily used by local residents in the summer. While general opposition to the placement of landfills in local neighborhoods is a well-described phenomenon (Rasmussen, 1992), the use of parks as temporary dump sites was a particularly contentious issue. In some areas, local residents picketed the sites, prevented people from dropping off their garbage, and prevented the pest control company from entering (CTV Toronto, 2009). Neighborhood residents expressed public health concerns regarding the use of pesticides, attraction of pests, and contamination of surrounding areas.

The sites were sprayed with a deodorant for odors and permethrin 0.25% for insect control. Residents were concerned about the spray drifting from the site and permethrin-containing runoff leaching into the ground. TPH reviewed the material safety data sheet (MSDS) of the product and other literature to evaluate its safety (ATSDR, 2003; Hazardous Substances Data Bank, 2001; Nu-Gro Corporation Inc., 2005). TPH also worked closely with SWM and the pest control company to ensure that the spraying occurred in a way that reduced the risk of human exposure.

Rodent bait stations containing difethialone, a second-generation anticoagulant, were placed around the perimeter of the sites. Local residents were concerned that children or pets may consume the bait (primary poisoning), or that pets would eat poisoned rat carcasses (secondary poisoning). Again, TPH reviewed the MSDS and literature on these products and discussed their application methods with the pest control company (Liphatech, Inc., 2011; Standing Committee on Biocidal Products, 2007). The bait was contained in secured and anchored stations kept within the fenced perimeter of the sites without public access to reduce the risk of primary poisoning.

The daily inspections of the sites by the managers found that flies and maggots were persistently present, but no significant infestation developed. Residents made anecdotal reports of rodents, but the inspectors found no evidence of active infestation. The few locations with concerns of leachate contamination received further assessment and management by TPH, SWM, and MOE.

During routine operations, public health inspectors respond to individual concerns from the community. In the strike, this role was filled by the Healthy Environments AMOH, who responded to telephone calls and e-mails from concerned citizens, the mayor’s office, and city councilors regarding the temporary dump sites. This provided consistency in messaging and allowed for surveillance monitoring of community concerns. TPH also prepared information on the public health concerns of the temporary sites for posting on the City of Toronto Web site. The MOH was TPH’s spokesperson for press conferences and media requests. TPH did not engage in broader discussions with the affected communities, however, as site selection was not done by the health department and a site would not be allowed to continue if it was deemed a health hazard.

Conclusion
The City of Toronto’s six-week legal labor disruption placed considerable strain on management and nonunion staff of TPHs Healthy Environments department to keep up with rabies calls and food complaint calls as well as the additional workload of daily monitoring of 24 temporary garbage sites and two transfer stations. TPHs ac-
tive participation played a vital role, however, in the successful operation of the sites.

Toronto’s unique experience of establishing 24 temporary dump sites and maintaining them for six weeks provided TPH an opportunity to analyze and manage the public health concerns associated with them. Without any previous similar experience, TPH was required to make decisions based on the staff’s judgments and the best available evidence. The remaining unanswered question is, how long can such sites be maintained? Toronto was fortunate to have a cool summer with a lot of rain, but hotter and drier conditions would have increased the odors, flies, and decomposition at the sites. In these conditions, additional pest and odor control spraying may have been required to manage the sites, but would not have been possible at some locations. The situation of significant infestation despite the best possible pest control would likely be the circumstance that would lead the MOH to declare the temporary garbage sites a health hazard and order the removal of the garbage. Further consideration of this issue is required to be adequately prepared for this occurrence in any future labor disruption.

Corresponding Author: Howard Shapiro, Associate Medical Officer of Health, Healthy Environments, Toronto Public Health, 2340 Dundas St. W., Toronto, Ontario M6P 4A9 Canada. E-mail: hshapir@toronto.ca.

References