

## Indoor Skating Arena Air Quality Guidelines for Arena Operators

To reduce airborne combustion products produced while the arena is in use, we recommend that arena operators follow these steps:

**1 Make sure the arena is well ventilated by fans and louvered vents.** Turn on the exhaust fans and louvered vents at least five minutes before operating the ice-resurfacing machine, as well as during and after the time the resurfacing machine is in use. To increase airflow through the arena, make sure the fresh air intakes are at the opposite end of the building from the exhaust outlet. Ceiling fans may help reduce the level of exhaust gases at ice level so run them continuously.

**2 Install three-way catalytic converters on ice-resurfacers.** Properly maintained three-way catalytic converters reduce levels of hydrocarbons, carbon monoxide (CO) and nitrogen dioxide (NO<sub>2</sub>).

**3 Warm up resurfacing machines outdoors or in a well-ventilated, specifically designed room.** Attach a hose to the exhaust pipe that mechanically expels the exhaust gases outside. Most vehicles must be warmed up for at least five minutes for catalytic converters to work properly.

**4 Extend the exhaust pipe of the ice-resurfacing machine upwards so it is at least 30 cm higher than the top of the rink safety barrier.** This will reduce the buildup of CO and NO<sub>2</sub> at ice level.

**5 Service the ice-resurfacer regularly.** Tune up after every 100 hours of use and analyze the gas content of the engine exhaust to make sure the engine is properly tuned. Ensure catalytic converters are working properly.

**6 Try to automate procedures as much as possible to ensure that safety measures are followed.** For example:

- Connect louvered vents electrically to exhaust fans so that they operate at the same time.
- Exhaust fans can be set to turn on automatically.
- Install timers to control the operation of infrared heaters.

**7 Install CO detectors near the ice surface and test them regularly.** Consider testing the arena air regularly for CO and NO<sub>2</sub> to ensure gas levels are acceptable.

**8 During every hour that the ice is used by the public, the average CO level shall not exceed 12.5 ppm. The average NO<sub>2</sub> level shall not exceed 0.25 ppm. Test results exceeding these levels should trigger an immediate response to rectify the cause (points 1 to 7 above).** Arenas should strive to keep exhaust gas levels as low as possible.

**9 Have standard operating procedures for arena operators and provide training for all new employees.** Review these procedures annually with staff.

Any illness among skaters, regardless of gas levels, should trigger immediate arena ventilation, a halt to all skating activities and a full investigation, including contacting the local Medical Officer of Health or the 24-hour Medical Officer of Health line at 204-788-8666.