Office printers emit hazardous particles: CBC special report

Having a desk next to an office printer may be as bad as sitting next to someone who's smoking, scientist says

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CBC News

That office stalwart — the printer — may be a source of air pollution and a potential health hazard, a CBC investigations team has found.

Office printers can release ultrafine particles, or UFP, that are so small scientists have only recently been able to measure them.

Researchers have raised concerns that tiny particles from sources such as printer toner, tobacco smoke, combustion soot, bacteria and mould could be absorbed into the lungs and cause eye, nose, throat and lung irritation.

UFPs have been linked in recent scientific studies to heart problems and lung disease.

Laser printers emit micro-particles that can affect air quality, researchers say. (CBC)

The CBC retained Pinchin Environmental, an environmental, health and safety consulting firm, to undertake testing of office printers at three different locations in Winnipeg: CBC offices, Eco Centre Green Office and Wardrop Engineering Inc.

Pinchin measured emissions from the printers by placing particle monitors above the units. It also tested the number of particles in the air, also known as background levels, when the machines were off.

The tests revealed that small particles (less than 0.1 micrometres) were emitted in high quantities from 20 per cent of the printers tested at the CBC and 42 per cent of those tested at Wardrop. UFP concentrations returned to background levels within one to two minutes after reaching maximum concentrations.

Twenty-seven per cent of the printers in that study were considered high emitters, or printers that emit more than 10 times the UFP than was found in the ambient air. And one printer was found to emit levels of UFP more than 70 times higher than those found in the ambient air.

"These small particles remain airborne for much longer than the larger particles that tend to settle out, and also when you breathe them in, they tend to penetrate much deeper into your lung," said Stephan van Eeden, an associate professor, department of internal medicine at the University of British Columbia.

"There's also studies that some of these particles are so small that they can actually penetrate into the blood stream and affect blood vessels and the heart," he told CBC News.

"Just per mass, the amount of small particles that you inhale if you sit anything from two to three feet

from the printer is about the same as sitting next to a person that smokes."

Prof. Stephan van Eeden at UBC says some of the printer particles are so small they can penetrate into the blood stream and affect blood vessels and the heart.
(CBC)

Australian study finds over a quarter of printers high emitters

The findings of the CBC-sponsored report echo the conclusions of another recent study by Australian scientists. Conducted by researchers at the Queensland University of Technology, the study measured the particle emissions of 62 printers.

It found that approximately 60 per cent of the investigated printers did not emit particles. But 40 per cent did emit particles and, of those, 27 per cent were high emitters.

"Various types of printers are widely used in offices and homes around the world and they have become standard indoor electronic equipment," reads the study, published in the Aug. 1 issue of the American Chemical Society's Environmental Science and Technology journal.

"However, they are a potential source of indoor pollutants producing volatile organic compounds and ozone as well as a variety of particle emissions."

Lidia Morawska, an author of the Australian study, said that numerous health problems, such as cardiovascular problems or cancer, have been blamed on the ultrafine particles, depending on their composition.

"Even very small concentrations can be related to health hazards," she said. "Where the concentrations are significantly elevated means there is potentially a considerable hazard."

The study found that in tests with the printers that emitted the highest levels of small particulate, the effects were similar to exposure to cigarette smoke. "The highest printer particle number emission rate found in the chamber study was … close to the median value of submicrometre particle number emission rates for activities such as cigarette smoking, occurring in residential houses," it reads.

It also found that indoor particle counts in office air increased fivefold during work hours due to printer use. Printers emitted more particles when operating with new toner cartridges and when printing graphics and images that required more toner.

EPA steps up particle research

The Australian study identified a number of Hewlett Packard (HP) printers as high emitters, something the company disputes.

"After a preliminary review of the Queensland University of Technology research on particle emission characteristics of office printers, HP does not agree with its conclusion or some of the bold claims the authors have made recently in press reports," HP said in an official statement.

"There are no indications that ultrafine particle UFP emissions from laser printing systems are associated with special health risks."

The U.S. Environmental Protection Agency recently stepped up its efforts in identifying health effects brought on by ultrafine particulate. In 2005, it awarded $40 million US to five U.S. research centres to identify the sources of particulate matter most responsible for health problems.

The grants were awarded to Johns Hopkins University, Harvard University, the University of Rochester, the University of California at Davis, and the University of California at Los Angeles to study high-priority issues related to the effects of airborne particles on human health.

One of the EPA-funded studies, conducted by researchers at John Hopkins University in March 2006, found that short-term exposure to fine particulate matter increased hospital admissions for cardiovascular and respiratory diseases among the study's participants. The conditions noted included heart failure, chronic obstructive pulmonary disease and respiratory infections.

"The study shows an ongoing threat to human health from airborne particles," said Jonathan Samet, senior author of the study and chair of the Bloomberg School of Public Health department of epidemiology, in a release.

Health Canada says it's still studying issue

Health Canada spokesperson Joey Rathwell said Monday that the agency "is still in the information gathering stage concerning this issue and cannot comment until the research is complete."

"Health Canada is, as part of the new government of Canada's regulatory framework on air emissions, consulting and gathering information that will support decisions on indoor air quality guidelines and product regulations," Rathwell told CBC News.

"In particular, we are in the process of updating our existing residential air quality guideline for particulate matter, and are as part of that process, reviewing existing and emerging scientific literature on sources of particles in the indoor environment."

This study will be examined in context with other literature in the field, Rathwell said.