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Break a CFL lightbulb, get 300 times contamination limit Poisonous *vapor* so bad, researchers recommend families no longer use CFLs

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Compact fluorescent light bulbs have long been known to contain poisonous liquid mercury, but a study released earlier this year shows the level of mercury vapor released from broken bulbs skyrockets past accepted safety levels.

Following

a story reported by WND last year about a Maine woman quoted \$2,000 for cleaning up a broken fluorescent bulb, or CFL, in her home, the Maine Department of Environmental Protection studied the dangers of broken CFLs and the adequacy of recommended cleanup procedures.

The results were stunning: Breaking a single compact fluorescent bulb on the floor can spike mercury vapor levels in a room – particularly at a child's height – to over 300 times the EPA's standard accepted safety level.

Furthermore, for days after a CFL has been broken, vacuuming or simply crawling across a carpeted floor where the bulb was broken can cause mercury vapor levels to shoot back upwards of 100 times the accepted level of safety.

Following the study, the Maine DEP made eight new recommendations for usage and cleanup of CFLs, including the recommendation to not even use the bulbs in carpeted rooms where children, infants or pregnant women live. The likelihood of breakage, near impossibility of cleanup and risk of prolonged exposure, the study concluded, are just too great.

The National Institute of Environmental Health Sciences website acknowledges that Brown University published a similar study last month confirming the Maine results: Breaking a fluorescent bulb sends mercury vapor levels to unsafe levels for the elderly, pregnant and young – and those levels remain elevated for days.

The NIEHS website states, "Today's CFLs underscore mercury's volatile vapor form, which is still a significant health concern – ventilation reduces but does not eliminate this toxicant. Mercury vapor inhalation can cause significant neural damage in developing fetuses and children."

According to a

Mercury Policy Project overview paper, unpolluted air contains one to two nanograms, or billionths of a gram, of mercury vapor per cubic meter. The U.S. Environmental Protection Agency has established a level of 300 ng/m³ as the safety threshold for prolonged exposure to the poisonous gas.

Some states, though not the federal government, have also established a safety threshold for a one-time, acute exposure to mercury vapor. California, for example, has established that any level of exposure over 1,800 ng/m³ has potentially harmful health effects.

The Maine study, however, discovered that upon breakage of a CFL, mercury vapors can rise "with short excursions over 25,000 ng/m³, sometimes over 50,000 ng/m³, and possibly over 100,000 ng/m³ from the breakage of a single compact fluorescent lamp."

In other words, the study found breaking a single bulb can send mercury vapor levels in a room to over 50 times the level that California considers dangerous and to over 300 times what the EPA has established as a safe level for prolonged exposure. Researchers in the study broke 45 bulbs in a variety of flooring surfaces and then studied lingering gas levels after a variety of cleanup techniques. The results contradicted a number of commonly held thoughts on CFLs, for example:

- Though proponents of CFLs often argue a single bulb only contains 5 mg of mercury, the study found it was an average. The bulbs actually range from 0.9 to 18 mg of mercury.
- Though the EPA's Energy Star program recommends placing a broken bulb "in a glass jar with a metal lid or in a sealed plastic bag," the study discovered mercury vapor leaches right through plastic bags. "Of the 12 different types of containers tested during the 23 different tests, the plastic bag was found to be the worst choice for containing mercury emissions," researchers stated. "Based upon this study, the DEP now suggests that a glass container with metal screw lid with a gum seal be used to contain debris."
- Though the Energy Star guidelines suggest ventilating a room for 15 minutes before attempting cleanup, the study found that in every case – even in well-ventilated rooms – it took over an hour to drop mercury vapor levels below the EPA safety standard.
- And for cleanup on carpets, the Energy Star guidelines suggest vacuuming and disposing of the dust bag. The Maine study, however, discovered that vacuuming served to simply stir the vapor into the air and "irreversibly contaminate the vacuum". The researchers, acknowledging it was inconvenient, recommended only one course of action for broken bulbs on carpet: remove the carpet.

The Maine study also discovered, however, that carpets aren't the only problem with broken bulbs.

"All three flooring surfaces in this study (pre-finished hardwood, short nap carpet, and shag carpet) were able to be cleaned up with pre-study cleanup guidance so that they looked clean. However, mercury vapors emanating from all three surface types were detected, especially when agitated, for weeks after the cleanup of a break. ... Flooring surfaces, once visibly clean, can emit mercury immediately at the source that can be greater than 50,000 ng/m³."

"Flooring surfaces that still contain mercury sources emit more mercury when agitated than when not agitated. This mercury source in the carpeting has particular significance for children rolling around on a floor, babies crawling, or non mobile infants placed on the floor."

As WND has reported, several countries,

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including the U.S., have signed laws that will eventually phase out typical incandescent light bulbs and dictate their replacement with CFLs.

Even the U.S. EPA, however,

has recognized that recent studies show CFLs aren't safe for all circumstances.

The Maine study may prove the most condemning of the use of fluorescent bulbs yet.

Part of the study detailed the potential hazards posed by mercury vapor:

"There are a number of studies documenting neurotoxicity as a consequence of inhalation of elemental mercury in adults. ... Studies documented changes in EEG, deficits in peripheral nerve function, autonomic effects, psychological and sleep changes, and deficits in fine motor performance, visuomotor coordination, visual reaction time, visual scanning, memory, concentration, and executive function."

In children, and especially unborn children, the results can be far worse:

"It is well established that the developing organism may be much more sensitive than the adult to neurotoxic agents. For example, methylmercury exposure can produce devastating effects in the fetus, including cerebral palsy, blindness, deafness, and even death, while producing no or minimal effects in the mother."

Children are also more susceptible to mercury vapor exposure from broken CFLs:

"Infants and toddlers also have a much higher rate of respiration than adults. Therefore they have a higher exposure to similar concentrations. They also are lower to the floor and therefore closer to the source of the exposure and presumably more apt to obtain a concentrated dose of mercury."

The study, however, didn't leave out the elderly:

"Elderly and unhealthy individuals may already be at compromised health and be more susceptible to mercury effects than a healthy individual. For example, mercury does kidney damage which could exacerbate an already existing kidney disease."

Unlike many poisons that can be flushed out of the body, mercury bioaccumulates, which means the various tissues store the toxin in increasing amounts, a particular concern as the use of CFLs increases.

The Mercury Policy Project summary paper quotes an estimate that the U.S. currently releases two tons of mercury vapor into the environment each year from broken fluorescent bulbs alone. Two tons contrasts startlingly with the level the EPA has established as dangerous to human health: a mere 300 billionths of a gram