

Coffee beans deemed hazardous to workers' health

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Credit: George Hodan/public domain

A warning for coffee workers in roasting factories and corner cafes across the country: keep your face away from the bins of roasted beans.

That's the latest word from the U.S. Centers for Disease Control and Prevention, which is examining the health hazards faced by some 600,000 people nationwide who spend their days roasting, grinding,

packaging and serving [coffee](#).

The agency is conducting tests at about a dozen facilities across the country in the wake of a Milwaukee Journal Sentinel investigation that exposed how a naturally occurring chemical endangers coffee workers. The agency's first test results, from a midsize roasting facility in Wisconsin, found extremely high levels of two lung-destroying chemicals in the roasting bins.

Investigators with the National Institute of Occupational Safety and Health, or NIOSH, a research arm of the CDC, spent several days at Madison-based Just Coffee in July. Investigators tested personal air space and took air samples to measure the concentration of the chemicals diacetyl and 2,3-pentanedione. They also evaluated the company's ventilation and other operating systems.

Diacetyl has been tied to the deadly lung disease bronchiolitis obliterans, more commonly known as "popcorn lung" for its association with the many illnesses suffered by microwave popcorn workers in the early 2000s. The chemical's molecular cousin, 2,3-pentanedione, has shown equal toxicity in animal studies.

Both chemicals have been made synthetically to give a buttery flavor to all kinds of foods and beverages and have been deemed safe to ingest in trace amounts. Inhaling the compounds, however - whether natural or synthetic - can prove deadly.

The tests at Just Coffee were the agency's first study of a coffee facility that does not use added flavors. The results underscore the risk faced by all coffee workers, not just those in facilities where artificial flavors are used.

The two chemicals form when coffee beans are roasted and then are

released into the air in greater concentrations when the beans are ground. Levels also build up as the beans "off gas" in the storage bins.

NIOSH Director John Howard told the Journal Sentinel the issue is a priority for the agency.

"There's a large number of workers and the harm is really severe," he said.

Last year, the Journal Sentinel hired an industrial hygienist to sample the air in the Just Coffee plant and another Wisconsin roastery. Both agreed to allow the news organization to test for the chemicals.

Results showed levels at both facilities exceeded the government's safety recommendations, in some cases by nearly four times. Executives at Just Coffee then asked NIOSH do a full health hazard evaluation to get a better idea of the scope of the problem and understand how to protect workers.

NIOSH researchers found levels in three breathing-zone samples that exceeded the safety levels recommended by the CDC.

The CDC has proposed that workers not be exposed to more than 5 parts per billion of diacetyl over an eight-hour work day, during a 40-hour workweek. Results showed one Just Coffee roaster was exposed to more than 7 parts per billion.

Researchers noted typical exposure levels could actually be worse depending on the time of the year. That's because the testing was done when two large bay doors on each end of the production space were open and accessory fans were being used to increase air flow. Had the bay doors at Just Coffee been closed - as they usually are during colder months - the level of contaminants could have been higher.

NIOSH researchers went back to Just Coffee last month to do additional testing when the doors were closed and to conduct medical tests on the workers. Results from that visit are expected in the coming months.

Scientists familiar with diacetyl and 2,3-pentanedione say workers' exposures to short blasts of high levels are also of significant concern. NIOSH found diacetyl concentrations inside the bins where beans are stored reached as high as 7,000 parts per billion. Thus the warning for workers to avoid sticking their heads in or hovering over the containers.

"We certainly do think peak exposures are important because they happen throughout the day," said Rachel Bailey, a medical officer in NIOSH's respiratory health division.

Bailey noted the results were the first among a dozen studies of coffee processing facilities now underway across the country. Future results will focus more on specific tasks workers complete and look for links between medical data and exposure sources.

NIOSH researchers also warn that the storage bins can contain high levels of [carbon monoxide](#) and carbon dioxide, gases that in high enough concentrations can lead to serious illness and death.

Two bins tested in the Just Coffee plant exceeded the agency's ceiling limit of 200 parts per million for carbon monoxide. Researchers cited a number of case studies from 2002 to 2013 of people being poisoned by carbon monoxide after roasting coffee in poorly ventilated areas.

Exposure levels vary

The degree of exposure in an establishment depends on a variety of factors such as ventilation, number and size of batches roasted, how much coffee is ground on site and what type of equipment is used. The

test results highlight potential problems in production areas of commercial settings and cannot be applied to grinding and brewing coffee at home or sipping a cup in a cafe where grinding and roasting occurs.

In interviews, CDC officials stressed the importance of employers testing the air to find out what the contaminant levels are in their production facilities. It's impossible to know by looking or even smelling.

In addition, they said, employers should implement medical surveillance programs to monitor employee lung function.

Damage from diacetyl can occur quickly though symptoms may emerge more gradually. One of the main indicators of a potential problem is shortness of breath, especially after exertion such as from climbing stairs. It is important that workers have baseline and regular lung function tests so any decline can be spotted early.

Those with bronchiolitis obliterans are often initially misdiagnosed with asthma, chronic bronchitis, emphysema or pneumonia; or their symptoms are attributed to smoking, CDC experts say.

Last year, five coffee roasters- from cafes to midsize facilities - agreed to share their medical tests with the Journal Sentinel and have the results reviewed by three doctors with experience in diacetyl-related illnesses. Of the five workers, four had lung tests or symptoms consistent with hazardous exposure to the chemical, according to the doctors. Further testing would be required for a diagnosis.

Coffee workers with concerns about their health should alert their physicians to their occupation.

The Journal Sentinel investigation also found that despite huge advances in medicine and data collection and analysis in recent decades, the nation's workplace-illness surveillance system remains incapable of detecting clusters of medical conditions related to specific jobs.

Matt Earley, co-founder of Just Coffee, said the specialty coffee industry is quickly recognizing the potential hazards of diacetyl and 2,3-pentanedione and taking steps to protect workers. His company, for example, has improved ventilation and is looking for possible ways to mitigate exposure from the storage bins.

"To me, it's a real opportunity for the industry to develop new technology and equipment that will take care of this," Earley said.

So far, he said, the fixes have not been outrageously costly, adding that having NIOSH assess the work environment has been a help.

"It's not at all like a punitive government agency coming in and saying 'we're shutting you down.' NIOSH is so appreciate of companies who are stepping up right now and helping them develop their standards and understanding of this. It's been really helpful to us.

"You have to be proactive and willing to take the necessary steps to protect your workforce."

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