California unions win first workplace regulation of hazardous flavoring ingredient diacetyl/local success underlines global regulatory failure

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A long union push for workplace regulation of the highly toxic food flavoring diacetyl has resulted in the introduction of a strict new workplace standard in the state of California. California's initiative has not generated an equivalent binding standard at federal level, but federal authorities have expanded their limited, voluntary guidelines to now include diacetyl substitutes which are equally lethal. In the EU, by contrast, it's still business as usual, with not even a safety review in sight for this potentially fatal workplace hazard.

Diacetyl (also known as Butanedione and 2,3-Butanedione) is a chemical which is used, singly or in combination with other chemicals, to produce artificial flavors. These are mainly dairy flavors (e.g., butter, cheese, sour cream, egg, and yogurt flavors), "brown flavors" (e.g., caramel, butterscotch, brown sugar, maple, coffee flavors) and some fruit flavors including strawberry, raspberry and banana. It is also used in vanilla, tea, and other flavorings

Diacetyl has been definitively linked to the rare crippling lung disease bronchiolitis obliterans, now widely known in the US as "popcorn workers lung" after a rash of cases developed among workers making butter-flavored microwave popcorn, which uses diacetyl in relatively high concentrations. While often (mis)diagnosed as asthma or emphysema (and thus letting companies and governments off the regulatory hook), bronchiolitis obliterans differs from these diseases in the rapidity with which it destroys the bronchioles, the lungs' tiny airways, leading to severely diminished respiratory capacity. In 1985, the US National Institute of Occupational Safety and Health (NIOSH) concluded that workers in the mixing room of a company supplying flavoring materials to bakeries developed "insidious" obstructive lung disease within a short time of beginning work. In 2008, the IUF and the UK Hazards magazine reported on the case of Martin Muir, whose lungs were nearly destroyed when bronchiolitis obliterans set in after 3 months of working at the Yorkshire, UK factory of the transnational flavoring company Firmenich.

The symptoms of bronchiolitis obliterans are shortness of breath, wheezing, coughing and fatigue. The disease is irreversible; severe cases can lead to death.

Diacetyl occurs naturally as a result of certain fermentation processes and therefore is present in certain beers, wines and dairy products. But it is the use of diacetyl as a

synthetic food flavoring, rather than naturally occurring diacetyl, which has given rise to serious health concerns. Artificially synthesized diacetyl has been used for many decades as a food flavoring ingredient, but is rarely if ever specifically identified. It is generally lurking on the product label only as 'artificial flavour' or 'artificial butter flavour', if it is identified at all. *Due to insufficient regulatory and labeling requirements, the full extent of global worker exposure is therefore not known.*

Manufacturing workers will generally handle diacetyl as a yellowish liquid in various mixing stages of production, through the risks of inhaling the vapours are not confined to mixing; it is also used in powdered form. The most common protective measure – paper masks – offers no defense against the effects of diacetyl inhalation.

Manufactured diacetyl is used in a wide variety of food flavorings employed in the manufacture of frozen and snack foods (including microwave popcorn and potato/corn chips), confectionery, baked goods, dairy products including processed cheese, sour cream and cottage cheese, commercial baking mixes, icings, salad dressings, sauces, marinades, pet food and other processed foods and beverages. In the US, synthetic diacetyl is even added to unsalted butter – to impart a more 'buttery' flavor! US scientists have estimated that diacetyl is used in the manufacture of some 6,000 commercial products.

Workers in restaurants or commercial kitchens are also at risk, since diacetyl is a common ingredient in margarines, shortenings and cooking oils and sprays. Heated for cooking, these ingredients release toxic vapours. According to Dr. Richard Kanwal of NIOSH, "It is possible that the amount of diacetyl being released in commercial kitchens where these butter-flavored products are being used could equal or perhaps exceed what was found in the popcorn plants."

In the United States, with growing numbers of food industry workers succumbing to 'popcorn lung', IUF-affiliated food unions pushed legislation which would have required the federal occupational safety and health agency OSHA to set mandatory exposure limits for diacetyl and regulate exposure, controls and monitoring procedures.

The bill stalled in Congress, but the UFCW in California – a state with some 20 food flavoring plants plus a large food processing industry - petitioned the state authorities to immediately issue an Emergency Temporary Standard for diacetyl. At the close of 2010, Cal/OSHA responded with a legally-binding standard which requires employers to create a regulated area for each process using diacetyl, unless the process is enclosed. The standard mandates detailed safety measures including a written diacetyl control program, strict labeling requirements and periodic monitoring of exposure levels. Personal protective equipment is mandatory and various types of respirators are

mandated according to concentration levels. Training and medical surveillance are to be provided by the employer at no cost to employees.

The full text of the standard is available on the Cal/OSHA website here

In response to the growing number of “popcorn lung” lawsuits, some major companies loudly announced a shift to “diacetyl free” manufacture, including “no diacetyl” microwave popcorn. The problem is that the more common diacetyl substitutes are chemically related to diacetyl and potentially have a similarly toxic impact on the lungs. These include the chemicals 2,3-pentanedione, 2,3-hexanedione, 2,3-heptanedione, acetoin and diacetyl trimer.

According to NIOSH, “2,3-pentanedione, 2,3-hexanedione and 2,3-heptanedione are less water soluble than diacetyl, which could mean that they penetrate deeper into the lungs and could have an even greater toxicity than diacetyl.”

In January 2011, US OSHA expanded its “National Emphasis Program” setting safety guidelines for microwave popcorn plants to include these diacetyl substitutes. However, neither this program, nor regulations pertaining to food flavorings, specify permissible exposure levels (PELs) or are legally binding standards.

Under the National Emphasis Program the government at least maintains a registry of microwave popcorn plants where workers are potentially at risk. In the EU, regulatory, safety and trade bodies acknowledge extensive use of diacetyl in food processing and flavor manufacturing but have never made public information on where or how the chemical is used, the size of the exposed population or any details of health surveillance or research into diacetyl exposure as a workplace health and safety issue.

EU Occupational Safety and Health Directives currently set no exposure limits for diacetyl, which has never been evaluated with regard to inhalation and other forms of exposure in manufacturing. EU legislation on food flavorings does not specify use levels or define categories of foodstuffs that are permitted to contain flavorings, despite a 2007 study which concluded that "Exposure to an agent during diacetyl production appears to be responsible for causing bronchiolitis obliterans syndrome in chemical process operators, consistent with the suspected role of diacetyl in downstream food production."

In 2007, the European Food Safety authority (EFSA) stated that it was looking into safety aspects of diacetyl and that *The experts of the EFSA AFC panel and its working group on food additives will look at this issue to see if new scientific evidence is available that may require further actions."*

In recent correspondence with the European Food Safety Authority, however, the agency has stated that diacetyl has been declared safe, that no new evaluation was

carried out, that it has no plans to do so, and that evaluation falls outside its mandate, which is limited to oral exposure rather than inhalation.

The EU's vaunted "precautionary principle" is nowhere to be found in this catechism of regulatory inaction. Regulatory paralysis in Europe mirrors the situation in the United States, where the professional chefs' organization called on the federal Food and Drug Administration (FDA) to withdraw from diacetyl its "generally recognized as safe" designation. The FDA claimed it was powerless to act because the "safe" designation refers only to safe for eating, whereas the health risks to workers arise from inhaling vapours and are therefore a matter for… other agencies.

The IUF therefore repeats our call of 2007:

"No worker should be expected to work with a substance linked to a debilitating and potentially fatal occupational disease. In the absence of a comprehensive risk assessment of all workers potentially affected by diacetyl exposure, there is simply no way to determine if the US experience is being replicated elsewhere.

"In view of this threat to workers' health and lives, the IUF is therefore calling on its member unions, on the wider labour movement, and on health care and medical organizations concerned with worker health and safety to immediately demand action by national and supranational health and safety regulatory agencies.

"All available information regarding products and brands using diacetyl in food manufacturing must be made publicly available and readily accessible. Food workers' unions must be officially involved as active partners in a program of comprehensive research into the hazards associated with workplace exposure to diacetyl in food processing, including on-site investigation to monitor possible exposure, evaluation of production methods, assessment of protective measures and rigorous medical surveillance of all workers potentially at risk. Risk assessment must include an evaluation to determine whether the substance could be eliminated entirely and, if necessary, replaced with safer alternatives. The current state of knowledge warrants an immediate suspension of the use of diacetyl pending a thorough appraisal of its workplace risks."

To which we can add a call for the immediate suspension of diacetyl's chemically similar "substitutes".