Horizon scanning - Popcorn Flavourings

Progress report for the June 10th Meeting of WATCH

At the March 2004 meeting of WATCH a member drew attention to a recent alert from NIOSH concerning outbreaks of severe lung disease in workers exposed to the vapours of food flavouring agents, in particular, a substance known as diacetyl, which imparts a butterscotch flavour to popcorn. Diacetyl is also known as 2,3-butanedione.

NIOSH published this alert in December 2003. The publication notes that there are over 1000 substances that may be used as food flavouring agents, including organic acids, aldehydes, esters and ketones, as well as thiols, sulphides and others. Occupational exposure limits are available for a small fraction of these agents such as acetaldehyde, acetic acid, ethyl acetate, furfuryl alcohol and resorcinol. Although these substances are generally regarded as safe (GRAS) to humans when present in foods at the very small amounts permitted, workers can be exposed to high concentration of the irritant vapours from these materials in mixing and heating operations.

The particular incidents highlighted in the NIOSH alert largely emanated from workers exposed to diacetyl, resulting in clusters or individual case reports of severe respiratory problems, with some cases of bronchiolitis obliterans currently awaiting lung transplants, and other cases of obstructive airways disease. All of these incidents were in the US.

As a result of this alert, HSE’s Food and Agricultural Sector of FOD were contacted. The details were then passed to those in FOD with responsibility for the food industry. Members of FOD have made extensive enquiries in the time available, but can find no evidence of diacetyl being used in the manufacture of popcorn in the UK. One UK popcorn manufacturer stated that his company only used natural ingredients. A small number of additional UK manufacturers of popcorn have since been located and have yet to be contacted. In addition, the topic was raised by HSE FOD personnel at the new Food Manufacture H&S Forum and at the Food & Drink Federation. The latter (FDF) has been very helpful and has published details of the NIOSH alert in their newsletter Health and Safety Update No 41 April 2004. This newsletter invites companies to send information to HSE.

HSE will continue to investigate whether or not there is any use of diacetyl as a food-flavouring agent in the UK. In addition, the HSE Occupational Respiratory Disease (ORD) sub-programme will consider the development of a more extensive evidence-base on food flavouring agents in due course. Diacetyl may not be the only agent of concern. Furfuryl alcohol is used as a food flavouring agent, and the OESs of 5 and 15 ppm (8-hr TWA and STEL respectively) were deleted in April 2003, in light of evidence for nasal cancer in rats exposed to 2 ppm and above in an NTP study (1999). Furfuryl alcohol is also widely used in foundries. Many food flavouring agents also have diverse industrial uses. The NTP data indicates that furfuryl alcohol is not likely to be genotoxic, and it seems that the nasal tumours may have been caused by chronic
irritation. There are permitted standards for the amount of furfuryl alcohol in foods, but these are largely based on oral dosing data, which are of lesser relevance to the inhalation exposure route. The data on furfuryl alcohol and diacetyl raise the question of whether or not there may be a generic issue with exposure to volatile food flavouring agents. As noted above, this issue will be considered alongside other potential priorities within the ORS sub-programme.

Maureen Meldrum
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