

# Public Meeting on “Criteria for a Recommended Standard: Occupational Exposure to Diacetyl and 2,3-Pentanedione”

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# Potential Concerns

- No current proposed NIOSH Ceiling Values for diacetyl or 2,3-pentanedione
- Skewed data for diacetyl exposures for QRA
- Lack of baseline physicals and spirometry results at start of employment
- Broad “net” approach to butter flavorings
- Mixed atmosphere in MW butter flavored popcorn plant
- Possible concern with low odor threshold

# No current proposed NIOSH Ceiling Values for diacetyl or 2,3-pentanedione

- Short elevated episodic releases may be important in development of respiratory disease
- Such tasks may include: opening mix tank, pouring butter flavoring into mix tank, checking level in mix tank, catching a QC sample from the mix tank.
- Addition of powder containing diacetyl or 2,3-pentanedione to ribbon blender, hopper...
- These short tasks can result in brief high exposure and may not necessarily be addressed by engineering controls

# Skewed data for diacetyl exposures

- Retrospective look relies on samples primarily collected after Gilster-Mary Lee MW butter popcorn plant association of obstructive lung disease with butter flavoring exposure (Parmet and Kreiss articles were **published in 2002** based on work in 2000 and 2001).
  - Shortly after many plants were beginning to ratchet down worker exposures through changes in work practices and addition of engineering controls.

# “Skewed” data for diacetyl exposures, cont’d.

- Many of the obstructive lung cases resulted from exposures preceding 2000 and these exposures were likely quite a bit higher than those measured by NIOSH from 2001 and later.
- Use of more recent and likely lower diacetyl air sampling results should result in an over-estimation of risk for the collective pool of employees used in the NIOSH quantitative risk assessment (Appears to include some employees that left the company with obstructive lung disease before air sampling was conducted at their plant).

## Lack of baseline physicals and spirometry results at start of employment

REL based on potential for 1 case in 1000 for working lifetime for 60% of predicted FEV<sub>1</sub> or the 5<sup>th</sup> percentile of normal...p. 129.

# Lack of baseline physicals and spirometry results at start of employment, cont'd

- Employees may start employment with exposure to prior chemicals known to result in decreased lung function. Some chemicals include:
  - Chlorine, sulfur dioxide, nitrogen oxides (silo fillers disease), high particulate exposure (cement work), exposure to alkaline dusts, cigarette smoke.
  - It appears that few (if any) of the 6-companies studied by NIOSH had performed baseline spirometry and/or baseline physicals just prior to or at start of employment for the vast number of employees handling butter flavorings.

## **Lack of baseline physicals and spirometry results at start of employment, cont'd**

- Select medical conditions may result in employee starting employment with fixed obstructive airways impairment

## Broad “Net” approach to butter flavorings

- “While the focus of this document is on diacetyl and 2,3-pentanedione, **NIOSH has concern about other flavoring substitutes with structural similarities to diacetyl or moieties that are biologically active and capable of producing similar toxic effects as diacetyl.** Therefore, NIOSH recommends that such exposures also be considered and controlled as low as reasonably achievable.” **p. 218**

# Broad “Net” approach to butter flavorings, cont’d.

- How does a company work with this approach?
  - Includes 2,3-hexanedione and acetoin
  - Does it include butyric acid, acetic acid, lactic acid, acetaldehyde?
  - What about diketones? Select ketones?

# Flavor and fragrance facility, portion of chemical storage room



# Mixed atmosphere in MW butter flavored popcorn plant

- Aside from diacetyl (as well as 2,3-pentanedione) several other compounds are present. Some compounds include: acetoin, butyric acid, acetaldehyde, acetic acid, lactic acid.
- Current thinking is that some of these compounds may exacerbate health effects of diacetyl/2,3-pentanedione. Current derivations of NIOSH RELs appear to be based solely on diacetyl/2,3-pentanedione exposures and therefore should overestimate health risk.
- NIOSH should consider indicating that diacetyl/2,3-pentanedione are surrogates for workplace exposures in MW butter flavored popcorn plant

# Possible concern with low odor threshold

- Low odor threshold may pose an issue regarding current proposed NIOSH REL (5 ppb) and NIOSH REL (25 ppb).
  - Diacetyl odor threshold is ~50 ppb. Since cooked butter or margarine is smelled very easily, could the air concentration of diacetyl exceed the NIOSH REL of 5 ppb or NIOSH STEL of 25 ppb? Does anyone know? If it does, the proposed low NIOSH REL and STEL may have significant implications for professional and home cooks.