OREGON OCCUPATIONAL SAFETY AND HEALT DIVISION
DEPARTMENT OF INSURANCE AND FINANCE
INDEXED MEMO

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SUBJECT: Carbon Monoxide Gas Formation in Closed Dairy Equipment

AFFECTED CODES/
DIRECTIVES: Division 4J – 437-04-1280

PURPOSE:

(1) PURPOSE: To inform compliance officers of carbon monoxide (CO) build up in closed dairy equipment during cleaning operation.

(2) BACKGROUND: Federal OSHA reports that a death occurred during the cleaning of closed dairy equipment which was attributed to the formation of CO from the reaction of certain reducing sugars and oxygen in the presence of hydroxide ions. Alkaline solutions used for cleaning purposes (such as sodium hydroxide, sodium orrthosilicate, and sodium metasilicate at concentrations of 5% and higher) at 850 C and higher temperatures may react with reducing sugars (2% and higher solutions of fructose, galactose, arabinose, levulose, lactose maltose, as well as dry whey solids) in the presence of air to produce CO. The reaction will occur at lower temperatures, but the reactions are slower. This reaction based on current information does not occur in the presence of sucrose. Furthermore, no CO is formed with lactose or whey when other reagents such as sodium hypochlorite, calcium hypochlorite, phosphoric acid, or nitric acid are used in place of the alkaline solutions.

(3) Action: While it is rarely necessary to enter enclosed or semi enclosed equipment to remove adherent residue by direct hand scrubbing, compliance officers should carefully evaluate any confined space entry. Before entry, these requirements need to be taken.

(a) Vent the equipment before allowing worker exposure.
(b) Measure equipment atmospheres for CO, CO_2' and 02 before entering.