

AIRBORNE EXPOSURE TO PAPER ADDITIVES

FOREST INDUSTRY HEALTH RESEARCH PROGRAM

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The *Forest Industry Health Research Program (FIHRP)* has completed a study on exposure to paper additives through paper dust inhalation. A report is now available to members titled "**Paper Additives, Paper Dust and Fungal Spores Exposure at the Paper Machine**". To request a copy, phone **Agi Lee** at the Pulp and Paper Forum at (604) 777-1533, send a fax to (604) 777-1567 or E-mail alee@paperforum.com. Non-members of the Forum may be charged for the reports.

In this study, several FIHRP mills were surveyed for information on the type of additives used. Biocides were identified as the type of additive most likely to be associated with human health effects. Based on this information, two mills were selected for preliminary analysis of various matrices (wet-end stock, paper and paper dust) for the presence of selected additives (i.e. biocide components).

The preliminary analyses of bulk samples from one mill revealed significant concentrations of formaldehyde, a breakdown product of one of the biocides selected as a marker. Formaldehyde was found in "virgin" wet-end stock, "treated" wet-end stock, paper and paper dust. Analyses on samples from a second mill were also performed for other chemical markers found in other biocides, however, levels were below the limit of detection or results were inconclusive.

Based on the preliminary results, formaldehyde was selected as a chemical marker for further exposure assessments in the mill using the selected biocide. As a result of preliminary data from this study showing the presence of formaldehyde in process products, the mill substituted the biocide prior to the exposure sampling. Airborne exposure sampling data for formaldehyde therefore represent this contaminant as a general chemical contaminant rather than a paper additive marker. The scope of work was broadened to include exposure data on other aldehydes, paper dust and fungal spores.

Formaldehyde and acetaldehyde vapor/mist were found in airborne samples collected adjacent to the paper machine (dryer and reel control area) with concentrations up to 0.011 ppm and 0.051 ppm, respectively. Airborne paper dust concentrations at the winder were found to be very low except during blowdown operations where 22 mg/m³ was measured as a peak exposure. Formaldehyde was not detected in airborne paper dust, but worker exposure to formaldehyde from paper dust was theoretically calculated to be 0.82 ppt during normal operations and 0.082 ppb during blowdown. Fungal spores identified at the paper machine included *Penicillium* and *Cladosporium*. The concentrations did not exceed exposure guidelines.

This study indicates that exposure to biocides through paper dust inhalation is unlikely. However, the presence of formaldehyde after the biocide substitution suggests the presence of other sources of formaldehyde. If made airborne through the paper drying process (vapor) or paper cutting (in paper dust) formaldehyde may cause sensitization especially if a worker has had one or more previous episodes of acute exposure to this sensitizing compound.