

**Results** Chemical exposures as indicated by median and geometric mean values were low (e.g. 2.5 and 4.4 ppb respectively for methyl bromide) and none exceeded the NZ WES, although formaldehyde exceeded the TLV in 48 (26.2%) samples. The AMV-TLV threshold of 1 was exceeded in 54 (29.5%) samples. Major differences between the occupational groups (container, log and retail workers and fumigators) were not found. Time spent inside the container was significantly and positively associated with ethylene oxide, C2-alkylbenzenes and acetaldehyde, but this was based on a small number of detectable observations (non-detects 52.0%–95.9%) and for one chemical (methyl bromide, n=94) we found inverse associations.

**Conclusion** This study has shown that personal exposures measured over an 8 hour working day were low, with the exception of formaldehyde, and do not confirm earlier suggestions (based on measurements inside closed containers) that they regularly exceed exposure limits. Association with time spent unloading containers was weak suggesting that exposures may result from short peak exposures rather than continuous low level exposure.

#### 01D.4 OCCUPATIONAL EXPOSURE TO FORMALDEHYDE IN FRANCE IN 2015

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**Context** Formaldehyde has been used in a large range of activities for decades. It was classified as human carcinogenic in 2004 by the International Agency for Research on Cancer and in France, formaldehyde has been regulated as a carcinogen since 2007.

The aim of this work is to describe the occupational exposure to formaldehyde in France in 2015 and to identify the most exposed activities.

**Method** A formaldehyde job-exposure matrix, developed under the MATGÉNÉ programme, provides an exhaustive and retrospective exposure assessment for all jobs in France. These data were linked with the 2015 French census, annually elaborated from 2013 to 2017, to estimate the occupational exposure prevalence by gender, occupation, industries and worker status.

**Results** In 2015, 90 000 workers were occupationally exposed to formaldehyde (3.5% of the French population at work), 60 600 (4.6%) among men and 29 400 (2.4%) among women.

The industries with the highest prevalence exposure rate were for men veterinary area (8.8%), wood industries (7.7%) and agriculture (4.8%); for women, veterinary area (7.3%), fishing and aquaculture (5.3%) and agriculture (5.1%).

The exposed workers are retrieved in agriculture (26%), healthcare sectors (13.5%) and specialized construction work (12%) for employees and agriculture (69.6%), specialized construction work (13.5%) and other personal services (8.1%) for people with worker status different (mostly self-employed).

**Conclusion** These results, the first describing the occupational exposure to formaldehyde in France, according to gender for the entire working population, show the importance of regulation in the variation of occupational exposure prevalence rates. This information will help in the surveillance of this occupational risk and to prioritize prevention actions.

#### 01D.5 NON-DETECTS IN OSHA'S IMIS DATABANK: ARE THEY SHORT-TERM OR SHIFT-LONG SAMPLES?

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**Objectives** The Integrated Management Information System (IMIS) is the largest multi-industry source of exposure measurements available in North America. However, the lack of information on the censoring value (that depends on duration of sampling) of non-detected (ND) measurements considerably limits the usefulness of this databank. Released in 2010, the Chemical Exposure Health Database (CEHD) contains analytical results and measurement details, including duration of sampling for some of the records in IMIS. We assessed which ND results stored in IMIS are short-term (ST), and which are shift-long (LT) samples, based on information available in CEHD.

**Methods** We analyzed exposure measurements for 54 agents from 1984–2009 (n=238,826). First, we calculated kappa coefficients ( $\kappa$ ) for each agent to investigate the agreement between the exposure type of IMIS detected records (already indicated as ST or LT, i.e. selected by OSHA officers) and the exposure type suggested by sampling duration found in CEHD. If  $\kappa$  exceeded 0.3 for an agent, we employed classification and regression trees (CART) models to predict whether the ND results from IMIS should be classified as ST or LT samples. CART was developed using CEHD and applied to IMIS, relying on predictors common to both databanks: industry, reason for inspection, scope of inspection, region, union status, and year of sampling.

**Results** The median proportion of ND results per agent was 37% (interquartile range (IQR)=22%–62%). The median  $\kappa$  was 0.45 (IQR=0.37–0.64) and 0.03 (IQR=0.01–0.16) for solvents/gases and metals/isocyanates, respectively. Solvents (n=22) and gases (n=7) were selected for CART modeling. Industry was the most important predictor variable in classifying ND results into either ST or LT.

**Conclusions** This novel approach can be used to assign a censoring value to ND results, thus allowing more accurate inference about distribution of exposure levels in IMIS.

## Work Organisation

#### 01E.2 INFLUENCE OF WORK ORGANIZATION AND ENVIRONMENT ON HEALTH AND PRODUCTIVITY OUTCOMES AMONG CONSTRUCTION APPRENTICES: A TOTAL WORKER HEALTH® APPROACH

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**Introduction** Construction is a hazardous industry, with well-recognized risks of traumatic injury and high physical demands. Other threats to construction workers' health and well-being occur from work organization and work environment factors, including precarious employment, long