WINNIPEG Air Testing

Practical Health and Safety Solutions

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WATSIN Chemical Exposure Calculator WCB Grant

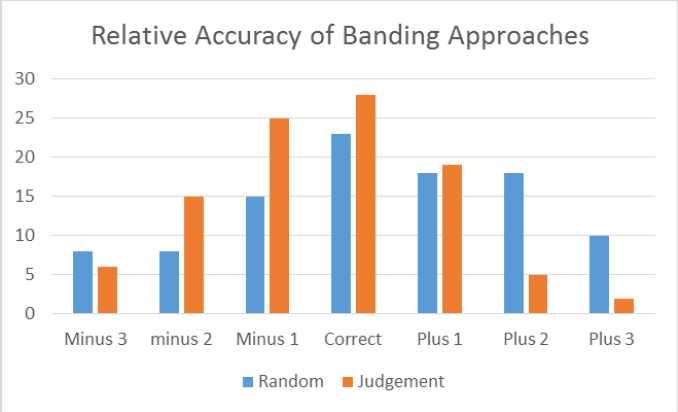
Workplaces typically have hundreds of chemicals. Most workplaces don't have the training to perform a credible worker assessment and the vast majority of worker exposures are never assessed. And who can blame them when you consider the cost of testing? Companies lack of a convenient and reliable way to estimate exposures. This leads to workers being exposed to unsafe levels of chemicals and overprotecting workers with low exposures which uses limited time, money, and resources that could be better spent elsewhere.

Exposure Banding

Exposure Banding (EB) is now a common way to characterize an exposure. The figure below shows an example of such an exposure banding hierarchy. The goal is to place the worker's exposure in the correct band with each band having a recommended action.

Predicted Exposure	Recommended Action
<1 % of the OEL	No Action Recommended
1 - 10% of OEL	General WHMIS Training
10 - 20% of OEL	plus specific training on hazards of products
20 - 100% of OEL	plus periodic exposure monitoring
> 100% of OEL	plus respiratory, engineering or other controls
Multiples of OEL	greater respiratory protection, improved controls or process shutdown

The most common approach to assessing chemical exposure is professional judgement. Basically, someone with experience looks at the process and produces an estimate of the exposure level. This seems logical but the facts indicate that it is not a very effective method of assessment.



Here is a graph that compares the professional judgement of practicing industrial hygienists to random selection. This data is taken from an AIHA exposure assessment course. It turns out professional judgement is not much better than random selection. It also shows a bias to underestimating exposure.

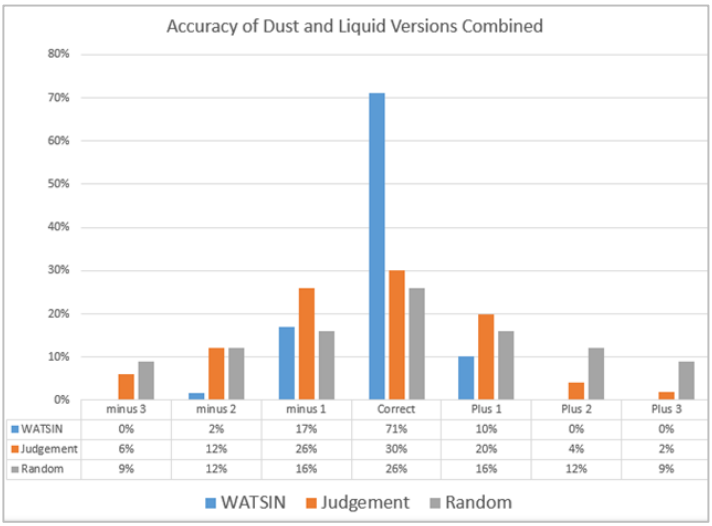
Chemical Exposure Calculator (CEC)

The WATSIN Chemical Exposure Calculator was developed to estimate worker exposure. The purpose of the WATSIN is to allow a layperson to perform exposure assessments. Answer six simple questions and you have a reasonable prediction of worker exposure.

The applications of WATSIN include:

1. Assessing chemical exposures as a screen for air sampling or perhaps a replacement of air sampling;
2. To predict exposures when considering substitution of new chemicals,
3. To recommend controls for a new process that is being installed; and
4. Assessing past exposures from previous activities.

How Accurate is WATSIN



In the development of WATSIN, Winnipeg Air Testing (WAT) has compared data from predicted exposures to actual lab results from a wide range of activities and settings and we believe that it provides a reasonable estimate of worker exposure.

No process is going to be correct every time. WATSIN is trying to be simple. The results to date show that it is significantly better than professional judgement.

Workers Compensation Board of Manitoba (WCB) Grant

While we have a current working version of WATSIN, we would like to collect more sample data to further compare WATSIN predictions and evaluate its accuracy. To do so, WAT has been awarded a grant by the Workers Compensation Board of Manitoba (WCB).

The WCB Grant is intended to help validate the WATSIN Calculator. The goal is to obtain a sufficient number of samples to fully test and validate the WATSIN algorithm.

In conjunction with WCB and Safety in Numbers (SIN), WAT is going to workplaces to collect exposure predictions using WATSIN, as well as performing air testing for the exposures – all at no cost to the company. The company receives a report with their findings and the sample data (minus any identifying information) is added into the WATSIN database.

Chemicals and Processes of Interest

There are two areas where the Grant would help access sampling data:

1. Less common industrial processes; such as acids and TIG welding.
2. Common processes that have low predicted exposures. Simply put, if the predicted exposure is less than 20% of the OEL, companies are not likely to proceed with air testing on a fee for service basis.

The following table provides the chemicals and processes that WATSIN would like to refine or further validate. These processes would be prime candidates for sampling to be covered by the Grant.

Exposure	Comment
Acids	Vapour hazard ratio (VHR) is likely not a reliable predictor because of solubility in aqueous solutions affects evaporation.
Sanding	Many different types of materials to consider. May need different factors for different types of dust (drywall, wood)
Sawing	Many different types of materials to consider. May need different factors for different types of dust (drywall, wood)
Grinding	Data to validate course vs fine grinding as well as grinding on different materials (metal, fibreglass, wood, etc)
TIG welding	Have a TIG factor in the Dust version but need more data
Brazing/Soldering	Likely need a new factor for this process
Solvents	Broadest group of industrial chemicals
Isocyanates	Typically low exposures but a priority of enforcement
Non-TWA OELs	Some OELs are based on ceiling limits

If you are interested in testing at your facility, have any questions, or require any additional information, please contact us at your convenience by phone at (204) 668-3141 or by email at contact@winnipegairtesting.com.

Sincerely,

Winnipeg Air Testing

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Real Life Example: Application of Isocyanate Product

A product containing Methylene Bisphenyl Isocyanate is spread out on a surface for 1 - 2 hours over the course of the day. There is no specific ventilation and the worker does not use any respiratory protection. What would the worker's exposure be? Do they need a respirator?

Information about the specifics of the conditions in the workplace were entered into WATSIN and the program predicted the worker's exposure. The prediction is shown below.

WATSIN Prediction

LIQUID EXPOSURE CALCULATOR

Process Name: Surface membrane fabrication

Description of Process: product is spread by hand over a period of 1 - 2 hours

Name of Product: 4,4-methylene bisphenyl diisocyanate

Duration: Exposure occurs 1 – 2 hours / day

Proximity: Worker at arm's length

Vapour Hazard Ratio: < 5

Nature of Process: Default

Controls: Open system with no administrative or engineering controls in place (basically no controls in place)

Estimated exposure is	Action to take
<1 % of the OEL	No Action Recommended
1 - 10% of OEL	General WHMIS Training
10 - 20% of OEL	plus specific training on hazards of products
20 - 100% of OEL	plus periodic exposure monitoring
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Air sampling performed for this worker found an exposure to Methylene Bisphenyl Isocyanate of 0.6% of the TLV – just as predicted by WATSIN.