IOHA
International Occupational Hygiene Association

Global Exposure Manager

IOHA Newsletter & Technical Updates

8th International Control Banding Workshop – Control banding and beyond

INTRODUCTION

There are 2.5 billion workers around the world who have no access to health and safety professionals. Control banding (CB) strategies, which can help prevent work-related illness and injury for those without professional support, have grown rapidly over the last 20 years. Originally, CB was conceived as an action-oriented qualitative risk assessment strategy, offering solutions and suggested control measures to users through 'toolkits'. During the last decade, CB has gone beyond its traditional qualitative approach, with some chemical CB tools, such as Stoffenmanager® and EMKG-Expo-Tool, providing quantitative exposure assessments. Other quantitative chemical exposure assessments tools, such as the Advanced REACH Tool (ART), ECETOC TRA and MEASE, also became available. It has also been shown that merely 'offering' a CB tool, without providing active support, does not automatically result in its use or appropriate use by small and medium enterprises (SMEs). For successful implementation of CB-and-beyond strategies, aspects other than technical model reliability issues need to be covered.

The 8th International Control Banding Workshop, held in Washington, D.C. as part of the International Occupational Hygiene Association (IOHA) 2018 Conference (24-26 September 2018), discussed the complete picture of success and failure factors of CB-and-beyond strategies. A full report is available on the *Occupational Health Southern Africa* website (www.occhealth.co.za).

WORKSHOP SESSIONS

Session 1: History, implementation and future of control banding

The meeting was opened by the IOHA President, Andrea Hiddinga, and followed by the opening keynote lecture by John Cherrie (Institute of Occupational Medicine and Heriot-Watt University, UK). He provided some background on the origins of CB in the 1990s as a way for the regulator in Britain to provide simple advice to SMEs. This initiative resulted in the COSHH-Essentials tool (http://coshh-essentials.org.uk). He highlighted the need for research to validate tools, both in terms of accuracy and reliability, and to verify the effectiveness of CB tools in real workplaces. Four areas of focus were suggested for developers: a) integration of training in, and support for, the tool package; b) improvement in accuracy of estimated exposure by combining model estimates with measurements, e.g. using a Bayesian statistical framework as pioneered in the ART; c) working towards having 'many tools' but a single exposure model; and d) finding ways to 'nudge' users towards lower exposures by suggesting how they can modify their work processes by adopting a higher band.

Wouter Fransman, from TNO in the Netherlands, spoke about the accuracy and reliability of exposure models. Ongoing development, adjustment and recalibration of the tools with new measurement data are essential to ensure adequate characterisation and control of worker exposure to hazardous substances. He ended with a vision of the future, where CB tools could incorporate measurement data from real-time sensors, and where information could be provided directly to workers via a cellphone app that would act as a 'personal job coach'.

The final talk, by Wes Chase from the Lawrence Livermore National Laboratory (LLNL), addressed the quantitative validation of the CB Nanotool. This is one of the new tools that has been developed specifically to provide advice for organisations using or producing nanomaterials. The tool was evaluated at LLNL, using a variety of quantitative measurement methods. The CB Nanotool is now a required element of the LLNL Nanotechnology Safety Program.

Session 2: Evaluation of REACH tier 1 and 1.5 tools – the ETEAM study: follow up by tool owners

At the 7th CB Workshop, results were presented on the ETEAM project ("Evaluation of tier 1 exposure assessment models used under REACH") on operational analysis and uncertainty between user variability and external validation. Clear advice was given to tool owners for further improvement of their tools. In Session 2, tool owners gave an update.

Martin Tischer (BAuA) previewed the new EMKG-EXPO-TOOL software (beta version, downloadable from https://www.baua.de/EN/Topics/Work-design/Hazardous-substances/REACH-assessment-unit/EMKG-Expo-Tool.html). He also presented a validation study of control guidance sheets for intermediate bulk container filling and emptying, and drum filling with organic liquids. To raise awareness about the correct design and use of these control measures, BAuA provides videos and a manual for good working practice.

Henri Heussen (Cosanta) presented the improvements in Stoffenmanager® (www.stoffenmanager.com). Underpinned with ~6300 measurements (ETEAM and later external validation studies), he concluded that Stoffenmanager® is a balanced, robust and sufficiently conservative tool. To reduce the between-user variability, Cosanta provides additional support such as training (including train the trainer), consultancy, webinars, instruction movies, a manual, and peer-reviewed user sessions.

The last speaker, Daniel Vetter (ERBC), explained how MEASE 1 can be used for exposure assessment for metals and inorganic substances. The tool is downloadable from https://www.ebrc.de/industrial-chemicals-reach/projects-and-references/mease.php. In the development of MEASE 2, a refinement of the underlying initial exposure estimates will be made (external validation), additional risk management measures (RMMs) will be incorporated, a PROC selection guide will be added to reduce between-user variability, and a report generator will be included. Furthermore, an interface with Chesar (the European Chemicals Agency Chemical Safety Assessment tool) will be implemented.

Session 3: Hazard banding/occupational exposure banding

Different terms for the same phenomenon are used in the European Union (EU), United States and other parts of the world. Likewise, different hazard banding engines are used to derive the bands from the H-phrases, e.g. by the National Institute of Occupational Safety and Health (NIOSH), COSHH and Stoffenmanager®. In some cases, industry has developed its own hazard banding schemes.

Theo Scheffers (TSAC) pleaded for the alignment and improvement of hazard banding/occupational exposure banding (HB/OEB). He presented a scientific strength score method to compare and align the different HB/OEB engines, although the owners of the engines showed little interest in working on this issue.

Dorothea Koppisch (IFA) presented a hazard banding scheme as a non-occupational exposure level surrogate based on a globally harmonised system (GHS). This scheme has been peer reviewed, published and implemented in Stoffenmanager® 7.0, replacing the original COSHH-Essentials hazard bands. It is based on using the safety data sheet (SDS) as the primary source of information, is exposure route specific, and includes eye damage, inhalation, skin damage and percutaneous absorption, and takes account of dilution of the product during handling.

Finally, Thomas J Lentz (NIOSH) presented an overview of the NIOSH OEB Process. The guidance and strategy are described in a NIOSH guidance document; an online e-tool has also been developed. The OEB provides a series of concrete steps to guide users through the evaluation of health hazard information and identification of the appropriate occupational exposure band from among five categories, based on severity of health outcomes (bands A to E, where band A is the highest air concentrations, and band E the lowest).

Session 4: Evaluation of quantitative exposure models

Emily Lee (NIOSH) spoke about external validation of higher tier exposure assessment tools used under the EU REACH Regulations. These data showed that the ART under-estimated exposure levels for liquids with vapour pressure > 10 Pa while, in the same situations, Stoffenmanager® 7 appeared to perform more consistently with an appropriate level of conservatism. The ECETOC TRA v3 appeared to lack conservatism.

Shao-Zu Huang, from the National Taiwan University in Taipei, reported on an evaluation of Stoffenmanager® 7 in Taiwan. Measurement data on solvents and exposure situations were collected from past exposure reports from the Taiwanese Labour Inspection. There was a tendency to over-estimate in low concentration scenarios and to under-estimate in high concentration scenarios. When using the default 90-percentile, Stoffenmanager® over-estimated all situations, demonstrating an appropriate level of conservatism. Incorporating Bayesian statistics resulted in more precise estimates.

Hanna Landberg (Lund University, Sweden) presented a case-study evaluation of the risk assessment approach of the REACH legislation, using exposure models (ART 1.5, ECETOC TRA 3.1 and Stoffenmanager® 6.1). The data put in question the generic exposure scenarios (ES) recommended under the REACH legislation. She concluded that downstream users may get better estimates by assessing their own ES, especially for chemicals with low derived no-effect levels (DNEL) and high vapour pressure. To decrease the number of falsely identified safe scenarios, she suggested that assessors use Stoffenmanager® as a tier 1 model instead of the ECETOC TRA.

Plenary discussion: harmonisation of models and hazard banding schemes?

A lively discussion on harmonisation of models and hazard banding schemes ensued. Although, from a professional stance, no one could reasonably be opposed to harmonisation, several hurdles were identified. In the EU, where model development is driven primarily by ECHA and the REACH Regulations, tool owners participate in dialogues to describe the differences between the tools. The meeting considered that this could be a first step towards harmonisation. There was also a discussion about IOHA taking an active role in harmonisation. Most were in favour of some kind of involvement. Discussions will continue at IOHA 2020 in Korea.

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