

## Miller, Diane M. (CDC/NIOSH/EID)

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From: zalk1@lnl.gov  
Sent: Sunday, June 08, 2008 11:18 PM  
To: NIOSH Docket Office (CDC)  
Cc: Chen, Jihong (Jane) (CDC/NIOSH/EID) (CTR); Doyle, Glenn (CDC/NIOSH/EID)  
Subject: 138 - ControlBanding Comments

Name  
David Zalk

Organization  
Lawrence Livermore National Laboratory

Email  
zalk1@lnl.gov

Address  
1413 Willowtree Court  
San Jose, CA 95118  
USA

### Comments

Pg. viii, Ln. 9: Either expand the 5th itemized action to include safety specifically, or preferably, add a 6th item that expands on the need to address injury prevention and the addition of occupational safety in the CB process to address the need for multidisciplinary activities in the development of Toolbox approaches to achieve injury and illness prevention.

Pg. xviii, Ln. 6: You can remove 'University of California' from my affiliation and Deborah is now with 'University of Colorado, Boulder'.

Pg. 42, Ln. 1: You should include the ACGIH White Paper here, though it should be pointed out that, though it is titled 'CB', they are only evaluating COSHH Essentials and the ICCT and are evaluating CB as a whole since they did not evaluate all the other national approaches.

Pg. 42, Ln. 1: Perhaps this is a location for inclusion of the conclusion aspects included in Item (1) below.

Pg. 47, Ln. 19: Include NIOSH work in South America and discussions at regional workshops.

Pg. 49, Ln. 12: This is the location to add items (2) – (4) listed below.

Pg. 50, Ln. 3: List begins with #4, either renumber or include #'s 1-3.

Pg. 53, Ln. 17: Germany now has their own online CB toolkit approach that is separate and distinct from the GTZ work. It from BAuA, can be seen as comparable to COSHH or Stoffenmanager, and is expounded within the Item  
(1) JOEH reference below.

Pg. 55, Ln. 14: Believe you have been updated on the latest with Stoffenmanager, this is a place holder to emphasize its inclusion. You can find much of the latest within the Item (1) review article as well.

Pg. 56, Ln. 11+: The work in Norway has expanded to ergonomics and other chemical exposure aspects, many relating to the oil industry still. If you need to contact Hans for more of the latest, please let me know.

Pg. 59, Ln. 17+: There is now work with model variations in India, Japan, South Korea, and more. Please defer to Marilyn on the level of establishment and worthiness of inclusion at this time. I will be in a better place to address this after the 4th International Control Banding Workshop in Seoul the first week of July with many of these presenting.

Pg. 63, Ln. 19+: Please include ICBW3, September 2005 in Pilanesberg, South Africa Third International Control Banding Workshop (ICBW3).

The Third International Control Banding Workshop [ICBW3] was held 21 September 2005 at the Pilanesberg National Park in South Africa in conjunction with the 6th International Scientific Conference of Occupational Hygiene (IOHA 2005). Probably the most important part of the unique nature of ICBW3 was its location, occurring for the first time outside the developed nations and solidifying the inextricable involvement of developing countries. This offered a unique perspective for presenting the ongoing process to discuss, evaluate, and further the concept of Control Banding. The three focus topics for ICBW3 included the following

sessions: Global Trends in Control Banding Collaborations, a Silica Workshop, and Control Banding's Expansion of Range beyond chemicals. The last two sessions highlighted the future context of the ICBWs, to further develop specific professional areas of practical prevention needs. The second session focused on silica and how Control Banding concepts could assist in accomplishing objectives on the ILO and WHO efforts relating to the International Programme on the Elimination of Silicosis. The discussions included the need for attention to worker health surveillance programs and examples of how an international silica toolkit could be utilized to start similar exposure reduction program in the countries now that the radiograph process had been completed. The closing session an eye on the future with details toward the expansion in the range of Control Banding strategies beyond the chemical realm. This included the expansion of ergonomic toolkit efforts that were initially presented at ICBW2 and had grown to include the International Ergonomics Association (IEA) participation with its NGO role in the WHOCC working in a parallel manner to early IOHA efforts (Zalk 2003). The theoretical future context for the expansion into the greater OSHH professions included psychosocial and safety considerations, and the opportunity to utilize video exposure modeling in Control Banding applications that are examples of what is essential to create a truly holistic primary prevention process for major illness and injury issues internationally. Taken together, the vision of combining the growing variety of OSHH toolkits parameters toward the needs of major trades was presented in the form of a Construction Toolbox built upon the successes of the recent past. Discussions that were integral to ICBW3 included a call for the scaling of "basic" risk reduction tools to those with and without funds. It was agreed that associated costs for achieving this are not in the development but in the implementation. To ensure that the obligation for this implementation is shared, international experts and government entities require a system to offer continuity over time. Therefore, included in the future vision are practical elements to promote small loans for enterprises and create funding mechanisms for implementation, validation, and maintenance over time.

NOTE: In addition, ICBW4 will be held in Seoul, South Korea at the XVIII World Congress on Safety and Health at Work on 1 July 2008. It will have an emphasis on safety and exploration into the latest national programs (India, South Korea, and Japan) and include IEA's including themselves in the ongoing CB effort with their latest Checkpoints. Marilyn is the keynote.

Pg. 91, Ln. 16+: As the IEA has now adopted the CB approach (see ICBW4 discussion), perhaps this should be acknowledged within this section.

Pg. 92, Ln 8+: Safety expansion has already begun and is being furthered in the Netherlands. There are three topics in this section that should be separated: Safety, Environmental, and Construction Toolbox. Only Environmental has not yet been addressed specifically. Safety and Construction Toolbox discussions can re-emphasize the ongoing work (items

3 – 4) and develop a US approach for joining in on Safety as NIOSH is already part of the International Working Group on the Construction Toolbox (Lentz and Gillen).

Pg. 95, Ln. 13: REACH has driven CB development within national OHSMSs, perhaps the US needs a similar driver. A discussion on these lines would be great to see. In fact, a separate REACH section would be wonderful as this is the driver that created online toolkits in the Netherlands and Germany, with more to come.

Pg. 101, Ln. 8: *ibid* IEA discussion above.

Pg. 103, Ln. 19: Include item 3 discussion below.

Pg. 108, Ln. 4: Please consider the including aspects of the item (1) paragraphs included below within this section.

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(1) Comprehensive Control Banding review article.

[NOTE: all the descriptions below (items 2 – 4) are also covered within this article, so this cite should be used in addition to the item specific cites below]

**ABSTRACT:** Control Banding (CB) strategies offer simplified solutions for controlling worker exposures to constituents often encountered in the workplace. The original CB model was developed within the pharmaceutical industry; however, the modern movement involves models developed for non-experts to input hazard and exposure potential information for bulk chemical processes, receiving control advice as a result. The CB approach utilizes these models for the dissemination of qualitative and semi-quantitative risk assessment tools being developed to complement the traditional industrial hygiene model of air sampling and analysis. It is being applied and tested in small and medium size enterprises (SMEs) within developed countries and industrially developing countries; however, large enterprises (LEs) have also incorporated these strategies within chemical safety programs. Existing research of the components of the most available CB model, the Control of Substances Hazardous to Health (COSHH) Essentials, has shown that exposure bands do not always provide adequate margins of safety, that there is a high rate of under-control errors, that it works better with dusts than with vapors, that there is an inherent inaccuracy in estimating variability, and that when taken together the outcomes of this model may lead to potentially inappropriate workplace confidence in chemical exposure reduction in some operations.

Alternatively, large-scale comparisons of industry exposure data to this CB model's outcomes have indicated more promising results with a high correlation seen internationally. With the accuracy of the toxicological ratings and hazard band classification currently in question, their proper reevaluation will be of great benefit to the reliability of existing and future CB models. The need for a more complete analysis of CB model components and, most importantly, a more comprehensive prospective research process remains and will be important in understanding implications of the model's overall effectiveness. Since the CB approach is now being used worldwide with an even broader implementation in progress, further research toward understanding its strengths and weaknesses will assist in its further refinement and confidence in its ongoing utility.

**CONCLUSION:** Further research remains a requirement for all CB models. This includes further internal validation of CB model components, broader external validation of the model predictions when compared to expert interventions, and especially the need for operational analysis of the model as implemented to achieve intended outcomes. A prospective research process therefore remains essential to achieve an understanding of the implications of the model as applied and how this correlates to its overall effectiveness for its target group. This will assist in addressing the remaining questions as to how control recommendations are being implemented and maintained and whether they are achieving the intended exposure reduction. The lack of this information has led many to question the overall effectiveness of CB models in that they have knowingly chosen simplicity at the expense of accuracy and, therefore, protection of the worker. This research needs to be performed and the results folded into an improvement process for CB models, which must include continual reevaluation of R-phrases and GHS Hazard Statements, in order to scientifically address these questions. In addition, further field studies are also vital to this research as they are necessary for providing essential validation and verification data which in turn will improve our practical understanding of the strengths and weaknesses of each of the models. In the absence of this information, the CB models as currently available are best used when OELs do not exist or as initial risk assessment screening tools that at some level include expert input and traditional IH monitoring. It seems that lost in these scientific validation discussions are the billions of workers who do not have access to expert advice. When further research is performed it must not stop short at the dissection of models. It must use the lessons learned from the process to build a better model that does have a place in the hands of non-experts. CB models are therefore, in essence, an opportunity to simplify the best of scientific information into a format that is accessible to the multitudes. Expert IH advice in practice is expensive and is non-existent in many countries, rendering it inaccessible to so many. This fact should not be used as an excuse to apply unvalidated control models blindly, but rather to serve as an impetus to expand the reach of this expertise and to develop it where it does not exist. With this in mind, the modern CB movement should continue to seek the finest technical expertise to make the models as good as possible. Seeking perfection will only ensure that the prevention of work-related disorders will not be achieved for the majority of the world's workforce.

Zalk, DM, Nelson, DI (2008). History and evolution of control banding: a review. *J Occup Environ Hyg.* 5(5):330-46

## (2) Nanotool: Qualitative risk assessment leading to controls for nanomaterial work.

**ABSTRACT:** Control Banding (CB) strategies offer simplified solutions for controlling worker exposures to constituents that are found in the workplace in the absence of firm toxicological and exposure data. These strategies may be particularly useful in nanotechnology applications, considering the overwhelming level of uncertainty over what nanomaterials and nanotechnologies present as potential work-related health risks, what about these materials might lead to adverse toxicological activity, how risk related to these might be assessed, and how to manage these issues in the absence of this information. This study introduces a pilot CB tool or 'CB Nanotool' that was developed specifically for characterizing the health aspects of working with engineered nanoparticles and determining the level of risk and associated controls for five ongoing nanotechnology-related operations being conducted at two Department of Energy (DOE) research laboratories. Based on the application of the CB Nanotool, four of the five operations evaluated in this study were found to have implemented controls consistent with what was recommended by the CB Nanotool, with one operation even exceeding the required controls for that activity. The one remaining operation was determined to require an upgrade in controls. By developing this dynamic CB Nanotool within the realm of the scientific information available, this application of CB appears to be a useful approach for assessing the risk of nanomaterial operations, providing recommendations for appropriate engineering controls, and facilitating the allocation of resources to the activities that most need them.

Paik, S, Zalk, DM, Swuste, P (2008). Application of a pilot control banding tool for risk level assessment and control of nanoparticle exposures. Accepted 28 May 2008 by Ann. Occ. Hyg.

## (3) Barrier Banding: Development of an injury prevention toolkit.

Similar to the banding of chemicals by toxicity, classifications already exist for various variables of accident causation. Banding safety risks for selection of appropriate barriers for injury prevention is similar to selecting appropriate engineering controls based on chemical hazard bands in CB. Barriers to injury, including management factors, are strongly related to the quality of safety management systems, and are important parameters for risk prevention. Presented for your consideration, this Barrier Banding model would apply safety phrases to accident scenarios or related situations and guide the user to the type of precautions needed to work toward an injury prevention toolkit.

Swuste, P, Zalk, DM. 'Control banding' or 'barrier banding,' a qualitative tool for risk prevention. Am J Ind Med. In press (2008).

Swuste, P. Qualitative Methods for Occupational Risk Prevention Strategies in Safety, or Control Banding Safety. Saf Sci Mon. 3(11) (2007) <http://www.monash.edu.au/muarc/ipso/vol11/Issue3/index.html>

Zalk, DM. Practical prevention in safety: from control banding to barrier banding. In International Working on Safety Conference. 2006. Eemhof, The Netherlands (2006).

## (4) Construction Toolbox

Control Banding (CB) strategies offer simplified solutions for controlling worker exposures to constituents often encountered in the workplace. The expansion of CB models, or toolkits, within the greater occupational health and safety professions affords an opportunity to seek prevention of work-related illnesses and injuries affecting the world's 2.8 billion workers. Multidisciplinary CB models for work-related risk reduction in construction need to unite the variety of hazards (chemical, ergonomic, safety, and environmental) faced by the industry's workers. Thus, the incorporation of individual toolkits into a Construction Toolbox is an appropriate next step. The International Control Banding Workshops have facilitated toolkit approaches for ergonomics, silica, and safety in a manner that includes the provision of national-level guidance and coordination of pilot projects at the state level. This Occupational Risk Management Toolbox approach concept has become a by-product of this coordination, which has broadened the CB model to include a more comprehensive exposure control basis for universal industries such as construction and agriculture. Working to further develop this multidisciplinary effort is an international, informal working group that includes the U.S., U.K., and The Netherlands that is seeking occupational health and safety professional input toward the development of a task-specific Construction Toolbox framework.

Zalk, DM. Barrier Banding and the Construction Toolbox. Proceedings of 4th International Control Banding Workshop at XVIII World Congress on Safety and Health at Work. Seoul, South Korea (2008).

Thienen, G, van, Spee, T. Health Effects of construction materials and construction products. J App Occup Sci. 1 (2008) [http://www.ohici.nl/pdf/health\\_effects\\_of\\_construction\\_materials.pdf](http://www.ohici.nl/pdf/health_effects_of_construction_materials.pdf)