



OCCUPATIONAL EXPOSURE - AN AUSTRALIAN PERSPECTIVE

Regulatory compliance – the challenge for multi-national corporations

Currently Safe Work Australia is reviewing the hazardous chemicals Occupational Exposure Limit (OEL) process with the findings due in the first quarter of 2017. In the absence of a Safe Work Australia OEL, the Australian Institute of Occupational Hygienists position paper is used as a guide, otherwise the best available data, such as the ACGIH TLV's can be used.

The ACGIH annually published list of Threshold Limit Value's (TLV's) is based on animal and human toxicology, and current epidemiological data. The TLV list also includes physical agents such as noise limits, vibration, ionizing and non-ionizing radiation, heat and cold stress.

Whilst regulators from other countries generally use their equivalent to the ACGIH TLV's for their OEL database, and some countries, like Indonesia, have simply adopted the ACGIH TLV's.

China for example has its own OEL's data set within their GBZ standards.

In the US, the Occupational Safety and Health Administration (OSHA) have Permissible Exposure Limits (PEL). The PEL is generally not the safe limit below which harm cannot occur, but is the legal limit (i.e. what is "permissible"), below which serious harm should not occur to most people. Therefore, while the OSHA PEL represents the legal exposure limit, National Institute for Occupational Safety and Health (NIOSH) provides some reference Recommended Exposure Limits (RELs).

The EU uses an equivalent 'Indicative' OEL that is non-binding, and 'Binding' OELs (BOELVs) that may be drawn up at a Community level.

The difficulty for multinational corporations, is that not all countries have the same set of regulatory OEL's. This makes it difficult for a corporation to compile a list of OELs for use in a single global corporate EHS management system. In most cases corporations adopt the lowest OEL from across the different jurisdictions, and use the lowest OEL, as the default corporate OEL.

Defining an Occupational Exposure Limit (OEL)

An OEL is a numeric value that represents the level of exposure to hazardous agents. Regulatory agencies set the limits to which workers can be exposed to particular hazards. These are also known as "Exposure Standards", "Occupational Exposure Limits" or "Threshold Limit Values" (TLVs). The most widely used limits are the TLVs issued in the

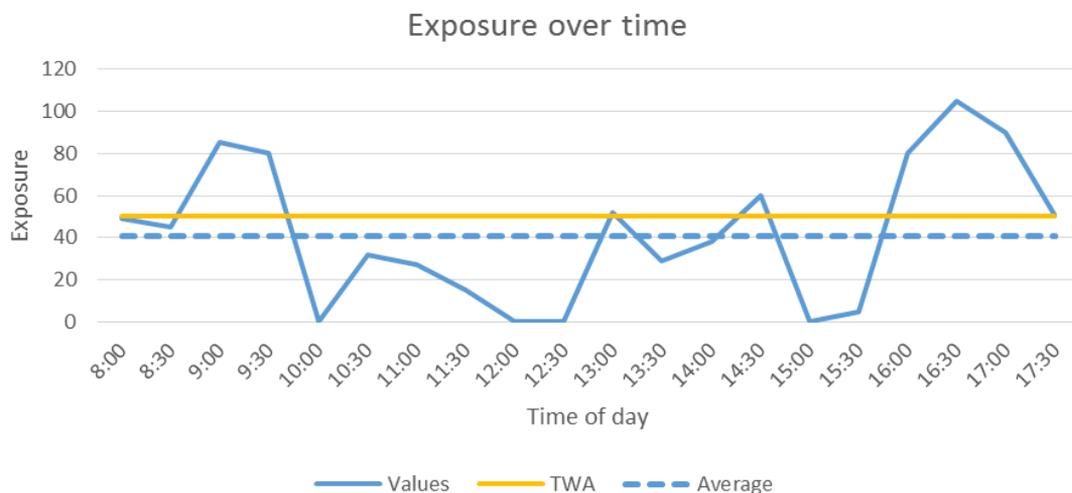
United States of America by the American Conference of Governmental Industrial Hygienists (ACGIH).

The TLV for a chemical substance is a level to which it is believed a worker can be exposed day after day for a working lifetime without adverse effects.

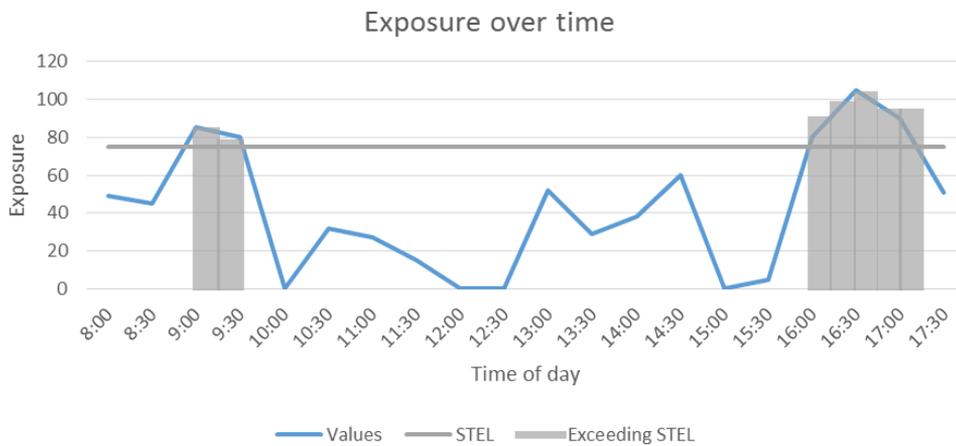
Unlike the Globally Harmonized System of Classification and Labeling of Chemicals there are no harmonised OEL's.

Three types of TLV's are used to determine exposure:

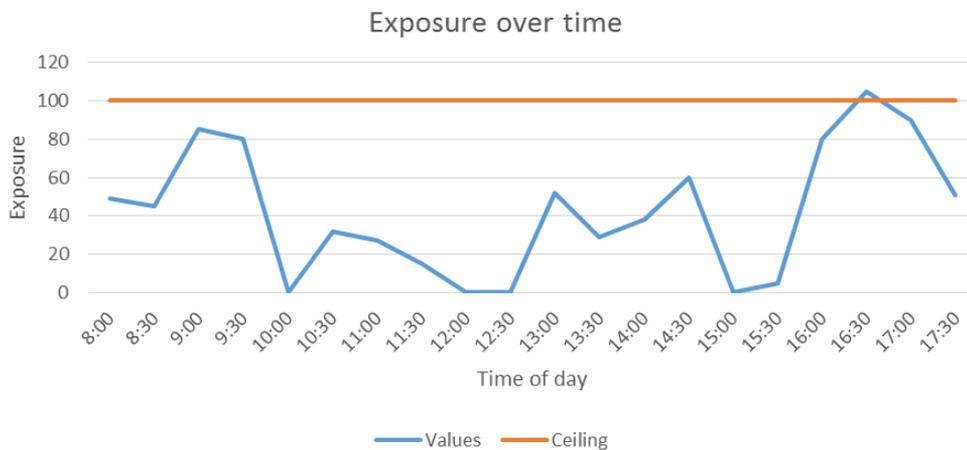
- Time weighted average (TLV-TWA): is the average exposure for an 8h/day, 40h/week work schedule.
 - o In the example below even though some exposures exceed the TLV-TWA of 50, the average value is still below the TLV-TWA of 50, and the excursions are also less than 5 times the TWA.



- Short-term exposure limit (TLV-STEL): is a spot exposure for a duration of 15 minutes that cannot be repeated more than 4 times per day with at least 60 minutes between exposure periods.
 - o In the example below the overall daily STEL is exceeded twice between 9:00 and 9:30, and five times between 16:00 to 17:15.



- Ceiling limit (TLV-C): is an absolute exposure limit that should not be exceeded at any time
 - o In the example below the Ceiling is exceeded at 16:30.



Determining occupational health risk from exposure to hazardous chemicals in Australia

The American Industrial Hygiene Association released a comprehensive step by step guide called "Strategy for Assessing and Managing Occupational Exposures. The guide is considered best practice, and includes detailed information on each step and the interpretation of the statistical analysis. The guide is widely used by Occupational Hygiene professionals in Australia.

Summary of steps:

1. Establish the occupational health risk strategy — including who is going to do the work, the definition of a decision criteria for acceptable exposures against an action level and OEL.
2. Basic Characterisation is an extensive cataloging and gather process of information from personal health data, Safety Data Sheets of the raw materials and byproducts

- and a walkthrough survey of the work environment.
3. Exposure Assessment: Assess exposures in the workplace in view of the information available on the workplace, work force, and environmental agents. The assessment outcomes include:
 - a. groupings of workers having similar exposures;
 - b. definition of an exposure profile for each group of similarly exposed workers relative to the appropriate OEL; and
 - c. judgments about the acceptability of each exposure profile
 4. Further Information Gathering: Implement exposure monitoring or the collection of more information to resolve uncertainty in exposure with higher confidence.
 5. Health Hazard Control using the hierarchy of control strategies for unacceptable exposures.
 6. Reassessment: Periodically perform a comprehensive re-evaluation of exposures. Determine whether routine monitoring is required to verify that acceptable exposures remain acceptable
 7. Communications, documentation, and storage of the risk assessment, and personal exposure data for at least 30 years.

Meeting regulatory compliance in Australia

Statistical analysis of the exposures is used to establish if the workforce meets regulatory compliance.

The following steps are:

1. Adjust the OEL for the duration of the shift, because OELs are based on an 8 hour shift. Safe Work Australia recommends the use of the Quebec model to adjust the OEL. The Quebec model is a spreadsheet modified by the Australian Institute of Occupational Hygienists that uses a variety of algorithms such as Brief and Scala and Pharmacokinetic modelling to calculate the time adjusted OEL.
2. Determine occupational exposure, using appropriate statistics, of the group of similar exposed workers. A confidence interval statistic for deciding an acceptable exposure is then chosen based on the acute or chronic nature of the hazardous chemical exposure.
3. Compare the statistic to the adjusted OEL.
 - a. Safe Work Australia states that a person conducting a business or undertaking must ensure that a worker is not exposed to airborne contaminants above the workplace exposure standard.
 - b. Compliance with an exposure standard can be demonstrated only when the exposure of individual workers or groups of workers is known, with an accepted degree of certainty, to be below the exposure standard.

Beyond compliance in Australia

An OEL will not protect all workers, hence the concept of an action level is often used. The action level is usually half the OEL. The action level is then used as trigger to review the

adequacy of the controls in place.

MORE INFORMATION

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