

Making the Case for Good Practices in Exposure Assessment and Management

Introduction

Whether employed by single organizations or working as consultants providing guidance to multiple client organizations, Industrial Hygiene/Occupational Hygiene (IH/OH) professionals require a number of essential technical, communication, and business-related skills to be successful. IH/OH good practice provides a science-based and practical framework for demonstrating competence and a commitment to employers, clients, and their workers. IH/OH good practice is also good business for employers and clients; as well as for IH/OH consultants, offering the potential for significant business value.

Key Points

IH/OH Professionals are an Essential Resource for Employers

- Employers rely on IH/OH professionals to protect workers, meet legal/regulatory obligations, and to manage and protect their businesses.
- What an IH/OH professional does can have significant impacts on clients and employers, their organizations, and their workers. High-quality work is essential to effectively support:
 - Protection of worker health
 - Regulatory compliance
 - Business management processes
 - Occupational Health and Safety (OHS) management systems

Employers and IH/OH Professionals Have Overlapping Responsibilities

- Duties of Employers
 - Ensure the health and safety of their employees and other workers in their workplaces.
 - Comply with applicable laws and regulations.
 - Retain competent persons to perform IH/OH-related work.
- Duties of IH/OH Professionals
 - Provide competent services and only when fully qualified.
 - Facilitate employer and client protection of their employees and other workers in their workplaces.
 - Comply with applicable laws, regulations, policies and ethical standards.
 - Facilitate employer and client compliance with applicable laws and regulations

Codes of Ethical Conduct for IH/OH Professional Have Been Established by Credentialling and Professional Organizations

- Identify responsibilities to professional organizations and to the IH/OH profession
- Identify responsibilities to clients, employers, employees and the public.
 - Complying with applicable laws and regulations
 - Delivering competent services in a timely manner
 - With objective and independent professional judgment in decision making
 - Recognizing the limitations of one's professional ability and provide services only when qualified.

IH/OH Professional Organizations Have Developed Good Practice Guidelines.

- IH/OH good practice is a visible demonstration of ethical conduct.
- IH/OH good practice reflects the IH/OH professional body of knowledge.
 - The set of concepts, terms and activities required to work as a professional IH/OH.
 - Practices that have been determined to reliably and effectively protect workers.
- IH/OH good practice guidelines fill gaps in outdated or incomplete regulatory requirements to ensure protection of worker health and safety. e.g. When regulatory schemes do not provide adequate guidance on conducting exposure assessments.

IH/OH Good Practice Supports Robust Business Processes and Workflows.

- Understanding employer / client needs and expectations.
- Communicating core IH/OH concepts in appropriate ways.
- identifying the specific issues to be addressed.
- Defining and communicating an appropriate, fit-for-purpose scope of work and deliverables.
- Obtaining buy-in for proposed approaches and solutions.
- Increased confidence in project planning and execution.
 - identifying and achieving data quality objectives.
 - confidence in results, exposure judgements and conclusions.
 - appropriate control recommendations.
- Improved working relationships with employers, clients and other business partners.
- Increased confidence in future work.

IH/OH Good Practice in Exposure Assessment Benefits Both IH/OH Professionals and Their Employers / Clients

- IH/OH professionals
 - Demonstrated competence in exposure assessment is a differentiator.
 - Provides a framework for engaging, informing, and educating employers/clients.
 - Approach is systematic, stepwise, iterative, and scalable.
 - Can be adapted for different organizations, contexts and problems.
 - Emphasizes continuous improvement.
 - Rational basis for proposed activities and deliverables.
 - Best practice approach to offering exposure assessment-related services.

- Avoids over-reliance on professional judgement.
- Increased confidence in results / conclusions / recommendations.
- Employers / Clients
 - Demonstrates a 'best practice' approach to achieving regulatory compliance.
 - Consistent with OHS management system standards.
 - Facilitates assessment of consultant qualifications and capabilities.
 - Basis for defining performance expectations.
 - Promotes transparency / accountability on the part of consultants.
 - Facilitates practical understanding of IH/OH concepts/terms/requirements.
 - Stepwise, scalable and flexible approach supports cost control.
 - Emphasizes context-specific results and data quality.

Making the Case

Duties of IH/OH Professionals to Clients / Employers

Under applicable OHS legislation as well as the standards of ethical conduct and good practice guidelines established by IH/OH credentialling and professional organizations, IH/OH professionals have a general duty to provide services that enable employers to meet their regulatory obligations and ensure that their workplaces are safe and healthy. IH/OH professionals must provide competent services within the limitations of their abilities and appropriate advice to employers / clients.

Using IH/OH Good Practice to Address Gaps in Regulations

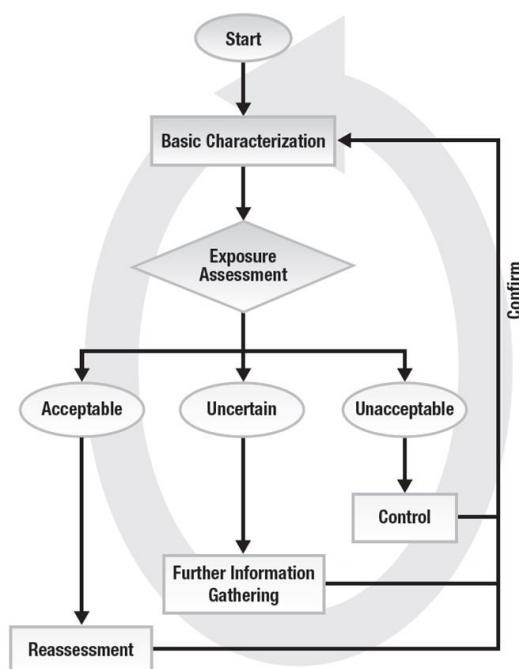
In general terms, OHS legislation worldwide requires employers to keep their workplaces free of known health and safety hazards by:

- Identifying and assessing existing and potential hazards.
- Characterizing the nature of identified hazards.
- Identifying interim control measures and prioritizing hazards for control.
- Updating hazard assessments as required to assess changes in the workplace.
- Ensuring assessments are conducted by qualified and competent persons.

However, OHS regulations can be incomplete or outdated relative to IH/OH science and practices. They may, for example, fail to define a science-based process for conducting workplace monitoring (e.g. sampling strategy, numbers of samples, data analysis and interpretation). In those cases, IH/OH professionals must rely on IH/OH good practice as described in established IH/OH references and guidelines, such as the American Industrial Hygiene Association's (AIHA) A Strategy for Assessing and Managing Occupational Exposures, 4th Edition (AIHA Strategy) and the AIHA Guideline Foundation's Principles of Good Practice (PGP), to ensure that their practices and advice provide appropriate worker protection.

The AIHA Exposure Assessment Strategy is detailed in AIHA's *A Strategy for Assessing and Managing Occupational Exposures* (4th edition). Risk Critical Practices key to the AIHA Strategy are concisely listed in the AIHA Guideline Foundation's *Principles of Good Practice for Occupational Exposure Assessment*.

Figure 1 – AIHA Assessment Strategy



Intuitively, simply collecting a larger number of samples would seem straightforward, however this does not guarantee “better” results. For example, A common criticism of consultant IH/OH surveys is that the quotation is based upon a certain number of samples covering many

substances used in the working environment, rather than on a thorough characterization of hazards and risks, or a strategy designed to check the effectiveness of existing controls.

For these reasons a systematic approach to exposure assessment is essential. Surveys should be designed in accordance with relevant guidance (e.g. AIHA Strategy / PGP, EN689). Survey design and quotations should be based on the complexity of the processes and the amount of investigation work that may be required rather than on simplistic proformas or formulae.

As in other fields, including engineering, healthcare, research, environmental science, business, and government where statistics provide frameworks for informed decision making, good IH practice emphasizes incorporating statistical considerations and the use of statistical tools and decision algorithms into the exposure assessment process.

In practical terms, IH/OH good practice as described by the AIHA exposure assessment strategy requires collecting background information and exposure data using a systematic approach and appropriate methods. The information and data are then analyzed using accepted statistical tools and algorithms in combination with professional judgement to assess the acceptability of exposures and define appropriate exposure management activities (Figure 2).

Figure 2 – AIHA Exposure Rating and Control Categories

	Exposure Rating Category**	Recommended Control
	0 (<1% of OEL)	No action
	1 (<10% of OEL)	Procedures and Training; General Hazard Communication
	2 (10-50% of OEL)	+ Chemical Specific Hazard Communication; Periodic Exposure Monitoring,
	3 (50-100% of OEL)	+ Required Exposure Monitoring, Workplace Inspections to Verify Work Practice Controls; Medical Surveillance, Biological Monitoring
	4 (>100% of OEL)	+ Implement Hierarchy of Controls; Monitoring to Validate Respirator Protection Factor Selection.

** Decision Statistic = 95th Percentile

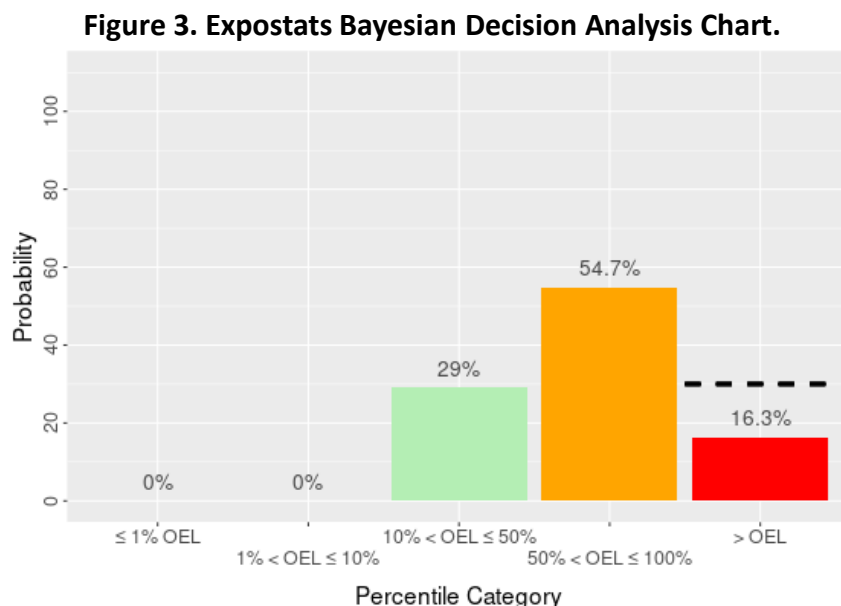
The Strategy strives for high confidence that no more than 5% of exposures experienced by a worker or a similarly exposed group (SEG) of workers ever exceeds an OEL. In statistical terms, this is achieved by maintaining the 95th percentile of exposures for a job or task below the OEL with a specified level of confidence.

Exposures are judged acceptable if the estimated 95th percentile for the exposure profile for an SEG is less than the OEL with at least 70% confidence. Additional monitoring as part of a continuous improvement process is recommended to increase the confidence level to 95% for SEGs with exposures in Exposure Categories 2 (10 – 50% OEL) and 3 (50 – 100% OEL).

Example of Worker Exposure Data Interpretation Using the AIHA Strategy

Six full-shift personal samples were collected from several workers in a similar exposure group (SEG) across several work shifts to assess exposure to toluene (8-hour TWA OEL = 20 ppm). Sample results were 6 ppm, 2 ppm, 8 ppm, 3 ppm, 4 ppm, and 7 ppm.

Analysis of the samples using the free Bayesian statistical analysis tool Expostat yielded the Bayesian Decision Analysis (BDA) chart depicted in Figure 3.



The BDA chart indicates that the SEG exposure profile 95th percentile is most likely between 50% and 100% of the OEL (AIHA category 3). There is only a 16.3% probability that the 95th percentile is greater than the OEL so we are more than 70 percent confident ($100\% - 16.3\% = 83.7\%$) that the true 95th percentile is less than the OEL.

Applying the recommended controls specified in the AIHA Exposure Rating and Control Categories for category 3 (Figure 2), we will implement the following exposure management activities for the SEG:

- Chemical specific hazard communication
- Required exposure monitoring
- Workplace inspections to verify adherence to work practice controls
- Medical surveillance and/or biological monitoring should protocols be available

Resources

- **European Union**
[CEN 689 2018](#)
- **Expostats Bayesian Calculator**
[Tool 1 Express](#)
- **Board for Global EHS Credentialing (BGC)**
[Code of Ethics](#)
- **American Industrial Hygiene Association (AIHA)**
“A Strategy for Assessing and Managing Occupational Exposures. 4th Ed.” AIHA Press. 2015.
[Member Ethical Principles](#)
[Principles of Good Practice](#)
[Exposure Decision Analysis Registry](#)
[The Meaning of “Good Practice” - Integrating the Technical and Business Aspects of Occupational Hygiene - BY TOBIAS STEELE](#)
Free Online Webinar "[Making Accurate Exposure Risk Decisions](#)"
- **American Conference of Governmental Hygienists (ACGIH)**
[Member Ethical Principles](#)
- **British Occupational Hygiene Society (BOHS)**
[Code of Ethics](#)
[Good Practice Guide for Consultants](#)
[Buyers Guide for OH Services](#)

Testing Compliance with Occupational Exposure Limits for Airborne Substances

- **Government of Alberta, Canada**

[GS009: Tips on selecting an OHS Consultant](#)

[GS019: Occupational hygiene reports: requirements and tips](#)

[GS020: Occupational Hygiene Competency](#)