



Occupational/Industrial Hygiene Knowledge and Competency Requirements

I. PREFACE

The International Occupational Hygiene Association's (IOHA's) National Accreditation Recognition (NAR) Committee holds a charter with the following purpose:

To promote global respect for and recognition of Occupational Hygiene Certification Programmes which meet or exceed the IOHA Model Certification Programme developed at the 1999 IOHA Workshop on Certification/Registration and approved by the IOHA Board of Directors on 8 July 2000 and revised in 2007 and 2008.

IOHA's accreditation criteria were defined and endorsed by IOHA's Board as minimum for a Nation's certification scheme to be recognized as meeting a hallmark of excellence in occupational/industrial hygiene.

IOHA accreditation criteria
1. Overall OH definition and goals of Organisation congruent with IOHA's.
2. Organisation has an appropriate Code of Ethics, and a mechanism for administering it.
3. Candidate education and experience-bachelor's degree plus suitable experience =7(minimum years). <u>Note:</u> The bachelor's knowledge/skills domains would be identified in a competency document to clarify the minimum criteria for member IOHA countries
4. Professional competence of candidate determined in a sufficiently rigorous fashion-e.g. what are the qualifications of the examiners and do they evaluate to world-class standards
5. Evaluation procedures used by Board are consistent and verifiable-e.g. objectivity/standardization/documentation of evaluation process. Note: ISO 17024 ISO/IEC was referenced as providing guidance useful in interpreting the intent of this criterion.
6. Maintenance of professional status requires ongoing/continuing professional experience/development-formal mechanism
7. Interface with related discipline professional certifications for enhanced broadness, expanding technical expertise and influence.

Given the subjectivity of criterion 3, this document attempts to provide a definition for *candidate education and experience-bachelor's degree plus suitable experience =7*. The NAR Committee members have developed, reviewed, and endorsed this document. It characterizes the Committee's best efforts at defining the global occupational/industrial hygiene knowledge

base and required to practice in the field with a minimal level of competency.

II. OVERVIEW

Knowledge must be acquired and maintained in order to competently perform in any field of practice. This knowledge can be gained through a formal education approach that includes required, specific course work. In this case whether the knowledge has been acquired can be verified by a student's academic record / transcript.

Knowledge can also be gained through a combination of work or practical experience and course work. In this case whether the knowledge has been acquired is often verified by means other than an academic transcript, such as by examination, letters of reference or work history. Similarly, relevant applied or professional experience can be verified by means such as letters of reference, work history, or portfolios that provide detailed descriptions of accomplishments with references.

The philosophy of the IOHA, and indeed occupational and industrial hygiene certification bodies from around the world, is that a combination of both approaches is necessary to assure a minimal level of competent professional practice. The occupational/industrial hygiene topics presented here do not focus on completion of specific courses, but on mastery of specific areas of knowledge required for the competent professional practice of occupational / industrial hygiene. We recognize that the specific means of acquiring this knowledge may vary by individual and / or area of the world.

III. OCCUPATIONAL/INDUSTRIAL HYGIENE KNOWLEDGE AND COMPETENCIES

The professional practice of occupational / industrial hygiene requires that applicants demonstrate knowledge and competency in the subjects of toxicology, fundamentals of industrial/occupational hygiene, exposure assessment and measurement, and mitigation and control of worker exposure. Successful applicants will demonstrate knowledge and competency in the following areas.

- A. Occupational/Industrial Hygiene Exposure/Risk Assessment
 1. Identify potential health hazards associated with processes, industries, and agents by observing tasks, processes, or sites, and by accessing and reviewing appropriate literature, standards, and other resources (e.g., inventory of materials used, discussions with people who perform the work) in order to anticipate worker exposure and potential health risks.
 2. Understand the physiologic and toxicological interactions of physical, chemical, and biological agents, and ergonomic factors with biological systems and the potential effects of occupational and environmental contaminants on worker health.
 3. Determine the relationship between exposure and the potential adverse health

effects of those exposures, using toxicological and epidemiological principles, published exposure standards, and manufacturer's material safety data sheets, as well as other credible resources, in order to anticipate and recognize potential hazards.

4. Design and implement effective exposure assessment strategies to assess the variability and magnitude of exposure.
5. Assess risks to worker health by analyzing qualitative and quantitative exposure data using risk assessment approaches and professional judgment and by comparing appropriate exposure parameters to standards and guidelines, where available.
6. Develop conclusions and recommended exposure mitigation actions, where needed.
7. Determine if further investigation is needed to assess risks to worker health and clearly report / communicate findings.

B. Occupational/Industrial Hygiene Risk Control

1. Based on the results of risk assessment, evaluate engineering, administrative, and personal protective equipment mitigation and control options using recognized standards, guidelines, and practices.
2. Considering all relevant information, select appropriate controls based on the principles of hierarchy of control so as to eliminate the hazard or reduce exposure to acceptable limits.
3. Coordinate resources as needed to ensure controls are effectively implemented and verify their effectiveness following implementation.
4. Confirm the ongoing effectiveness of exposure control measures.

C. Occupational/Industrial Hygiene Management

1. In conjunction with other OH professionals, engineers, and management, develop effective management systems to assess, communicate, and mitigate / control worker exposure to health hazards. Base management system elements on recognized risk assessment methods, appropriate hazard controls, and other information (e.g., regulations, current standards of care), in order to ensure a healthful work and community environment.
2. Implement management system requirements using a management system approach which applies project and process management tools and techniques, effective communication strategies, and periodic verification of effectiveness.
3. Initially and periodically evaluate management system effectiveness by comparison to regulations, professional standards, and recognized effective practices.
4. Recognize and consider important ethical, social, and cultural issues impacting worker health and the practice of Occupational/Industrial Hygiene.

IV. BASIC ACADEMIC REQUIREMENTS

It is clear that the above competencies require a sound background in the basic sciences

that must be acquired through academic study and / or course work. Successful applicants will be graduates of an accredited college or university, or other college acceptable to the applicable professional certification Board, with a Bachelors Degree (or First Degree) in biology, chemistry, chemical engineering, mechanical engineering, environmental engineering , physics, or other relevant science subject, or an accredited programme in occupational/industrial hygiene. The professional Board will consider, and may accept, any other Bachelors (or First) Degrees, or post graduate course work, from an acceptable college or university so long as the degree contains appropriate basic science course work and represents at least a prescribed number of hours of creditable subjects. Creditable subjects are undergraduate or graduate level courses in science, mathematics, engineering, and science-based technology. The social sciences, while important, should not be substituted for courses in science, math or engineering.

Evaluation of the science content of an undergraduate degree will be made from official course syllabi and transcripts. When further information about the content of a degree is required, the applicant will be requested to provide the information. Care should be taken that *official* transcripts are evaluated.

The professional Board will consider a college or university to be acceptable when it holds institutional accreditation as recognized by the Nation's Academic Accrediting Bodies. The degree must be awarded during the time for which the institutional accreditation was issued.

V. ATTAINMENT OF ADDITIONAL KNOWLEDGE FOR COMPETENT PROFESSIONAL PRACTICE

In addition to the bachelor's or first degree in a basic science, occupational/industrial hygiene, or engineering, successful applicants will demonstrate knowledge specific to occupational/industrial hygiene gained through post graduate course work and/or relevant work experience. This knowledge must address the subjects of toxicology, fundamentals of occupational/industrial hygiene, exposure assessment and measurement, and exposure mitigation and control. The certification body should verify that *all* the occupational/industrial hygiene knowledge and competency requirements for professional practice have been met and verified through academic records, references, work history, and detailed portfolios.

VI. MEETING CRITERION 3

Criterion 3 of the IOHA accreditation criteria, "candidate education and experience-bachelor's degree plus suitable experience =7", can thus be met in several ways. A bachelor's or first degree will count some number of years. Accomplishing a post graduate degree or an appropriate list of post graduate course work that addresses the broad areas of toxicology, fundamentals of occupational/industrial hygiene, exposure assessment and measurement, and exposure mitigation and control should be counted toward achieving the criterion. In addition, experience that is defined, documented, and likely to add to a candidate's knowledge as required in paragraph III should be counted toward the criterion. Other avenues for acquiring

the necessary knowledge may be also be determined by careful consideration of their effectiveness in developing and maintaining the knowledge needed for competent professional practice. While work in each of these areas is not necessary, the assignment of credit years to any of the above or other categories must be justified, and a mechanism for affirmation that the candidate can practice at a minimal level of competency must be determined in a sufficiently rigorous fashion-e.g. what are the qualifications of the examiners and do they evaluate to world-class standards (Criterion 4).

VII. DEFINITIONS

The following definitions explain terms used in this document and are meant to be a guide in satisfying Criterion 3.

- A. Basic Sciences
 - 1. General scientific concepts, anatomy and physiology, biochemistry, biology, chemistry, mathematics and physics; properties of flammable, combustible and reactive materials (compatibility); calculations such as those relative to gas laws, airborne concentrations, unit of measure conversions and conditions of non-standard pressure.
 - 2. Knowledge of human-environment relationships in and outside the work place; knowledge of the scientific method.

- B. Toxicology, epidemiology, and hazard assessment
 - 1. Basic biostatistics: statistical and non-statistical interpretation of data.
 - 2. Epidemiology: techniques used to study the distribution of occupationally induced diseases and physiological conditions in workplaces and factors that influence their frequency; concepts of prospective and retrospective studies, morbidity and mortality and animal experimental studies, data and distribution of data.
 - 3. Toxicology: dose response, mode of action, additive, synergistic and antagonistic effects, routes of entry, absorption, metabolism, excretion, target organs, toxicity testing protocols and aerosol deposition and clearance in the respiratory tract.

- C. Health Hazards
 - 1. Biological Hazards: principles of sanitation, personal hygiene, deleterious effects of biological agents or materials, viruses, bacteria, fungi, molds, allergens, toxins, recombinant products, blood borne pathogens, etc.
 - 2. Chemical Hazards: carcinogenic, mutagenic, teratogenic, systemic and reproductive effects resulting from inhalation, skin, and gastrointestinal exposure to chemical substances.
 - 3. Physical Hazards: physical characteristics of and stress arising from exposure to noise, vibration, heat, cold, ionizing radiation, non-ionizing radiation and poor lighting.

D. Exposure and Risk Assessment

1. Analytical chemistry, instrumentation, sampling methods/techniques, calibration, quality assurance, sampling strategy
2. Qualitative and quantitative exposure assessment.
3. Statistical evaluation of exposure data
4. Occupational exposure limits, threshold limit values.

E. Hazard Mitigation and Control

1. Administrative: Systems of work or safe practices that prevent or reduce risks to health, property and the environment.
2. Engineering: Local exhaust ventilation and dilution, airflow measurements, design principles. Isolation, substitution, containment and process change. Application of ergonomic principles. Control of physical and biological hazards.
3. Personal Protective Equipment: selection, use and limitations of respirators and protective clothing; respirator fit testing, breathing air specifications, glove permeability and eye protection.

F. Management System Principles

1. Acquisition, allocation, and control of resources; data management and integration, emergency planning and response.
2. Guidelines and standards: interpretation and use of guidelines and standards for the assessment of health hazards.
3. Hazard communication and training of employees.

G. Community and environmental health

1. Hazardous waste, air and water pollution, air cleaning wastewater treatment technology, emission source sampling, atmospheric dispersion of pollutants, ambient air and water monitoring, health and environmental effects of air/water pollutants.

H. Health, Safety & Environmental Legislation

1. Knowledge of the legal framework of occupational/industrial hygiene.
2. Understanding the legal responsibilities of employers and employees.