CANADIAN HANDBOOK ON HEALTH IMPACT ASSESSMENT

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Roles for the Health Practitioner

DRAFT

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Role of Occupational Hygienist within EIA

Chapter H Contents

Occupational health risks in Health Impact Assessment (HIA): their significance relative to general population risks

As summarized in Chapter D on epidemiology much of what we know about the adverse effects of environmental factors on humans is derived from our workplace experience. When a new material is introduced into commerce, workers are the ones who most likely will be exposed to high levels, day in and day out, over a working lifetime. In effect, as summarized by the report of the Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario (Dupre, J. S. et al, 1984): "The asbestos story demonstrates that the process of hazard identification can unravel slowly and that regulatory responses can lag behind the knowledge that slowly accumulates while a mounting toll of disease and death is borne by workers who are thereby cast in the role of human guinea pigs".

In the past workers have unintentionally played the role of the "Mining Canary, with their negative health outcomes serving as a warning for the rest of society. It behooves us to give prominent consideration to these individuals, who are not only responsible for societal productivity, but are most-at-risk, by virtue of the "dose-response relationship" that is fundamental to toxicology.

The chairman of Mansville Corporation, based on that Corporation's extensive litigation experience resulting from worker asbestos exposures, has indicated that their current operating tenets include:

- **activities in Safety and Health are going to be judged in the context of tomorrow's laws, not today's**
- **the ultimate test of professional success, is not whether you keep your company out of court, but the degree of trust between the companies that you work for or consult with, and the employees that you are there to protect.**

[Occup. Haz. Nov. 1992]

We need to remind ourselves that (according to the World Health Organization) "health" is not just to be considered in the negative (as in "absence of disease") but also, as "a state of complete physical, mental and social well-being" (WHO, 1967) not just of the general public but also including those select individuals known as workers. The "casualty" numbers cited for workers are higher in countries where occupational health and safety statutory and regulatory infrastructure is not in place. In other words, in nations that are "developing", or "in transition, a proper consideration of potential impacts on workers (which in that instance, can also include children, for example), as an integral part of the Environmental Impact Assessment (EIA), becomes even more compelling.

Recent statistics from the U.S. National Institute for Occupational Safety and Health - National Occupational Research Agenda indicate that "Each day, an average of 137 individuals die from work-related diseases and an additional 16 die from injuries on the job.

In Vietnam, occupational health is considered to be an integral part of EIA. Statistics from the Viet Nam National Environmental Action Plan indicate the following estimated percentages of workforces suffering from employment-related illnesses: construction - 55%; chemical - 61%; and, metallurgy - 66%.

Facets of, and Professional Disciplines in, Occupational Health

When conducting an Health Impact Assessment (HIA), it is quite appropriate to attribute considerable weight to the potential impacts of a development on workers, both positive (by improving socio-economic status) and negative. Occupational Health can be a rather expansive concept, and involve diverse workplace parties, including a "joint health and safety committee" (JHSC), off-site therapists, including occupational and physio- therapists, as well as various other clinical specialists, in the case of a need for after-the-fact therapeutic intervention. However, the focus in HIA is the prevention of negative health outcomes in populations, rather than the treatment of impacted workers.

The International Commission on Occupational Health (ICOH) uses the term "occupational health professional" to encompass occupational health physicians and nurses, occupational hygienists, ergonomists and safety specialists. This chapter considers primarily that

occupational health discipline that has evolved to proactively address potential toxic (amongst others) hazards "in, or arising from, the workplace" and whose practice is being increasingly applied[1] to broader human environmental health issues, by adaptation of the tools and techniques that had been developed for the industrial workplace.

Occupational / Environmental Hygiene

Industrial Hygiene (IH), as it is still known in some (United States.) circles, originated as a professional discipline in the early part of this century. In the United States, the first national conference on industrial disease was held in 1910, and the first governmental hygiene agencies were established just before World War I.

However, as part of the natural evolution, and with an increasing proportion of workers being found in the service sector industries, the discipline became known as Occupational Hygiene (OH). Indoor air quality (IAQ) in an office or commercial building became as much as issue in the 1980s as had welding fume exposure in the manufacturing sector in the previous decade. Carbon dioxide was developed as a surrogate of human occupancy, to permit a facile appraisal of the adequacy of ventilation from the standpoint of the primary purpose of most buildings. Meanwhile, urea formaldehyde foam insulation (UFFI) in some 80,000 houses across Canada, and a crescendo of concern about asbestos exposures among school children, due to thermal and acoustic insulating materials that had been applied decades earlier, led to a demand for quantitative appraisals of risk, based (in many cases) on an

[1] That is not to say that nursing or medicine is a discipline without proactive attributes, or that there are not practitioners who are very interested in prevention. The reality, however, is that clinicians are largely occupied with the diagnosis and treatment of pathologies that have arisen from adverse exposures, or, in conducting baseline / routine assessments of individuals, to be able to detect early changes; the latter (of course) may be protective to the population in question, even if this is too late for the individual.

evaluation of the extent of exposure. More recently, mouldy school portables have led to the expenditure of millions of dollars per year, in remediation, by individual

In Canada, the 1884 Ontario Act for the Protection of Persons Employed in Factories stated (in part):

> ***Every factory shall be ventilated in such a manner as to render harmless, so far as reasonably practicable, all gases, vapours, dust or other impurities generated in the course of the manufacturing process or handicraft carried on therein that may be injurious to health.***

Amendments in 1932 to the Factory, Shop and Office Buildings Act required employers to report any cases of industrial diseases directly to the Director of Industrial Hygiene.

school boards. This spread into the non-occupational arena extended the name of the profession (at least for some) to "Environmental Hygiene". However, we will refer to it by its most universally-accepted term of "Occupational Hygiene".

It is imperative that an accredited occupational hygienist (in the Canadian context, a "Registered Occupational Hygienist" - ROH) be involved in any HIA relating to a substantive project with a job-related element. Other individuals may perform adequately as well, but in the absence of demonstrable professional accreditation, may well not conform to "due diligence" expectations, should there be unanticipated problems in the future. Additional

information in this respect is provided in Section 7 of this chapter "Guidelines on the Selection of an Occupational Hygiene Specialist.

The CRBOH accredits (registers) two types of Occupational Hygiene practitioners: Registered occupational Hygienist (ROH) and Registered Hygiene Technologist (ROHT). ROHs are qualified professionals with a University degree in science and a minimum of five years of professional experience. ROHTs are qualified technologists who have a minimu of five years of related experience. Ongoing competency maintenance and development is demonstrated through a formal cyclic re-registration process.

The occupational hygienist is placed in the following context, by Canadian Registration Board of Occupational Hygienists (CRBOH):

- "Occupational Hygiene involves the identification of existing and potential human health hazards in, or arising from, the work place, the evaluation or assessment of the extent of risk posed by the hazards and, the development of effective strategies to eliminate or control the risks.

- Occupational Hygiene draws upon, yet integrates, background disciplines such as biology, chemistry, physics, medicine, engineering, toxicology, etc. In part, it can be regarded as that aspect of the Risk Assessment field which focuses on the interface between workplace-derived hazards and human health consequences. The management of these risks (by means of control programs) is similarly an integral part of the discipline.

- Occupational Hygiene is a unique, broad and multi-faceted discipline. To illustrate the nature of Occupational Hygiene practice, the following examples of typical functions are provided. These are only examples, and are not intended to be exhaustive, all-inclusive, or exclusive.

Within the definition of Occupational Hygiene, Occupational Hygiene practitioners may typically:

- review projects, designs and purchases to anticipate hazards.
- critically evaluate environments, processes, materials inventories, and worker demographics to recognize potential health risks to persons or communities.
- assess human exposures to hazards through a combination of qualitative and quantitative methods to determine health risks and regulatory compliance.
- recommend effective control measures to mitigate risks via engineering, administrative, or personal protective methods.
- communicate risks and control methods to affected parties including workers, unions, management, clients and/or communities.
- provide education and training about risks and control measures.
- conduct research and development of Occupational Hygiene methods and tools.
- provide academic education and training in Occupational Hygiene.
- develop, implement and audit Occupational Hygiene and related programs.
- manage, supervise or advise Occupational Hygiene personnel.
- coordinate Occupational Hygiene programs with related risk

management efforts, including Safety, Environment and Medicine.

- C interface with regulators, communities and professional associations.
- C advise on the development of government laws and programs related to Occupational Hygiene.
- C provide expert advice in legal and regulatory matters relating to Occupational Hygiene.

- Occupational Hygiene is generally defined as the art and science dedicated to the Anticipation, Recognition, Evaluation, Communication and Control of environmental stressors in, or arising from, the work place that may result in injury, illness, impairment, or affect the well-being of workers and members of the community. These stressors are normally divided into the categories Biological, Chemical, Physical, Ergonomic and Psychosocial.

- The Occupational Hygiene practitioner has comprehensive knowledge of work place chemical factors, and physical factors such as noise and heat stress. In terms of chemical factors, they also have knowledge of safety concepts (e.g. flammability, water reactivity, etc.). They are familiar with biological factors and ergonomics (especially in the case of specific environments such as office buildings) but would in many cases work in conjunction with (or, defer to) practitioners with specific expertise in these areas, as well as in health physics, occupational psychology, safety, etc. Accordingly, their knowledge in these areas would normally be more limited.

- The Occupational Hygiene practitioner is concerned with the broader (extra-workplace) environment, for example with respect to workplace discharges to the natural environment. As well, the practitioner has an appreciation of the

differential impacts of toxicants on workers and the general population (e.g. the greater susceptibility of children to lead).

It should be recognized that there may be other jurisdictional / regulatory requirements that overlap with, or even supercede, the HIA. For example, in Ontario, with any new development, there is a requirement for the proponent to conduct a pre-development review; this must be signed off by a PEng (at present, regulation under review).

Occupational Hygiene involves the anticipation, recognition, evaluation communication and control of hazards in, or arising from, the workplace (see Appendix ___, and/or http://www.crboh.ca/OHDefin.htm for a full definition, as provided by the Canadian Registration Board of Occupational Hygienists - CRBOH).

Occupational disease and its prevention; Occupational Exposure Limits (OELs) as a tool

We know that there are many negative health outcomes that have occurred in workers (and in some cases, their families) as a result of excessive workplace exposures (and, improper workplace programmes and/or facilities, such that workplace contaminants are brought home).

In occupational hygiene the environmental factors causing these negative health outcomes tend to be categorized into one or more of:

- Biological (e.g. mold in building ventilation, animal dander, Hepatitis virus)
- Chemical (e.g. welding fume, solvent vapour, flour)
- Ergonomic (e.g. work station and tool design)
- Physical (e.g. noise, vibration, cold stress, radiation)
- Psychosocial (e.g. poor labour relations, shift scheduling, "stress").

Here, we will deal only with the chemical factors, and mainly in terms of quantitative exposure criteria. We want to reduce health risks to an “acceptable” level. Risk, in turn, could be described as: Hazard x Exposure x Susceptibility = Risk

Chemicals are varied in their hazardous properties (e.g. toxic potential), and in the health outcomes that they can cause. These include some "contact" type conditions, such as dermatitis, or corrosive damage. However, by and large within the occupational context, we are concerned with exposure to airborne contaminants, that become inhaled into the lungs. They can either cause lung disease directly, and/or be absorbed into body fluids (e.g. blood) from the lungs and travel elsewhere in the body to cause other health concerns. We are considering potential effects ranging from irritation right through to fatal consequences either in the short or long term.

The prevention of the occurrence of these conditions is based on maintaining personnel exposures to airborne contaminants well below the levels recognized as having the potential to cause disease. This requires the ability to **anticipate** hazards that might occur, to **recognize** existing hazard potential, to **evaluate** the degree of exposure of the personnel (for comparison to accepted standards) and to conceive and implement **control** measures where warranted. In order for these to be effective, we have to **communicate** effectively, the risks to the stakeholders.

The best recognized (and most universally accepted) Occupational Exposure Limits (OELs) are the Threshold Limit Values (TLV®s). These are established by the American Conference of Governmental Industrial Hygienists (ACGIH - www.acgih.org), a private group of professionals from academia and government. Although OELs are sometimes compared to speed limits on the highway, their application and interpretation is considerably more complex than this. Anyone using the TLV®s (or derivatives) in a real-world situation is cautioned to read thoroughly the most recent Policy Statement and Introduction in the TLV® booklet published by the ACGIH at the beginning of every year. As well, if you are applying the TLV®s to particular substances, you are well-advised to read the appropriate section in the Documentation (now in its 6th edition, © 1991 - but as amended by Supplements annually).

It may be helpful to consider several exposure criteria, intended to protect members of the general public and workers, from chronic and acute health effects, as the case may be. These are:

Chronic-community-EHCs (environmental health criteria)
- air emission limits (e.g. point of impeingement - PoI);46.
- ambient air quality standards (AAQS);
- Criteria - drinking water, recreational water, irrigation water, soil, air, etc.;
- tolerable daily intake (TDI) or RfD (reference dose);

Acute-community (spill/discharge)
- AHIA's 1998 emergency response planning guideline (ERPG)
ERPG-1: 1 hour, mild, transient health effects
ERPG-2: 1 hour, no serious or irreversible or escape-impairing effects
ERPG-3: 1 hour, no life-threatening health effects
Acute/Chronic-workplace
- occupational exposure limits (OELs)-airborne, but may also be skin notation

Acute-workplace-airborne only -escape 30 minutes maximum
- Immediately dangerous to life or health (IDLH)

Criterion	Ammonia	Benzene	Chlorine
AAQS			
PoI	5		0.1
ERPG - 1	25	50	1.0
ERPG - 2	200	150	3.0
ERPG - 3	1000	1000	20.0
TLV® - TWA	25	0.5	0.5
TLV® - STEL/C	35	2.5	1.0
IDLH	300	500	10

The Occupational Exposure Limits (OELs) are not an "ideal" or "target" workplace level, but rather the maximum airborne level of contaminant currently acceptable. In the case of OELs adopted by Regulation, they are legal maxima. Even in situations where exposures are below the OEL, exposures should be reduced to the lowest practical level (where circumstances permit) on a matter of principle. The TLV®s (and related regulatory OELs) are subject to change, for a variety of reasons. For example, for many years the TLV® for formaldehyde was 1 ppm as a Time-weighted Average (TWA). In 1992, this was changed to a "Ceiling" (C) of 0.3 ppm, largely to reduce the incidence of sensory irritation.

In the case of workplaces that come under federal jurisdiction in Canada (i.e. under part II of the Canada Labour Code - this includes all federal employees, as well as those involved in inter-provincial activities such as banking, telecommunications, trucking, etc.) the TLV®s are actually the regulatory OELs (see 10.19(1) of the (Canadian Occupational Safety and Health Regulations (COSHRs)).

RabbitLake Uranium Mining: As described in a November 1993 report of the Environmental Assessment Panel, "the panel's consideration of health and safety issues included both community health and worker health and safety". Following a spill at Rabbit Lake in 1989, Cameco (the proponent) implemented a number of measures to promote the health and safety of employees at the Rabbit Lake operation, including:

- **appointment of an environmental and workers' safety committee;**
- **full time personnel in the safety department conducting training, monitoring, etc.;**
- **newemployees receiving basic training immediately upon arrival on site;**
- **an occupational health and safety committee for each of two shifts; and,**
- **an Atomic Energy Control Board (AECB)-approved Code of Practice for radiation protection.**

The

individual Occupational Exposure Limits (EOLs) generally assume that exposure is occurring only by the airborne route and by only one substance. Where there is extensive skin contact (particularly for those substances that have a "skin" notation) keeping airborne levels below the OEL may well not be sufficiently protective. With the typical concurrent exposure to multiple toxicants, the consideration of (and mathematical adjustment for) additive or synergistic relationships between the contaminants is also subject to interpretation and (professional) judgment. For further consideration of these points, see, e.g.: Risk Assessment: Totally Exposed. OHS Canada 12(4):56-57 (1996); Skin: The Final Frontier. OHS Canada 13(3): 38-40. (1997); Quicksilver, Slow Death - Mercury Poisoning. OHS Canada 14(2): 54- (1998); also visit web site http://www.ohscanada.com/homeset/articles/skin.html.

It may be helpful, to consider several exposure criteria, intended to protect members of the general public and workers, from chronic and acute health effects, as the case may be.

In the field of environmental / health protection, it is customary (e.g. as mandated by various regulations and departmental policies) to dichotomize toxicants into “threshold” and “non-threshold” types. The latter category includes genotoxic carcinogens and mutagens, which are regarded by some authorities as presenting some element of increased risk (say, in accordance with a “linear” dose-response model) no matter how low the dose. The alternative, is to invoke the concept and principle of physiologically-based threshold, and/or *de minimis* risk.

The TLV®s designate by “A” codes, those substances that they have categorized as to workplace carcinogenicity. These are numbered 1 - 5, from “Confirmed Human Carcinogen” through to “Not Suspected as a Human Carcinogen.” Under Canada’s Workplace Hazardous Materials Information Systems (WHMIS) legislation, a material is a workplace carcinogen if

so deemed by American Conference of Governmental Industrial Hygienists (ACGIH) and/or International Agency for Research on Cancer (IARC)[visit www.iarc.fr]

Prospective occupational hygiene applied to HIA - tools and techniques

In order to apply the principles of occupational hygiene (i.e. workplace risk assessment) to HIA, there are various items that should be “assembled”:

- clearly articulated and written statement of goals, and an identification of the standard(s) that will be assigned for the purpose of evaluation. In other words, will the goal be the preservation of worker health (as per the WHO definition?), or, simply compliance with statutory requirements?
- layout of the plant, identifying the location of the various processes, and other factors of significance to hygiene considerations (e.g. locations of operable windows, doors, etc.); names of the processes and equipment as they are intended to be used in the plant.
- description / schematic of process flow; chemicals inventory, by process.
- documentation of previous hygiene work that may have been conducted at predecessor / sister plants: air-sampling data, government reports, etc.; specifications for the local exhaust ventilation (LEV) system and other control methodologies.
- record of summarized health / disease data (e.g. incidence of back injury in Department X); Joint Health and Safety Commity minutes, or other documentation of concerns / complaints / symptoms, as above.
- a review of the scientific and professional literature, both text-based and “web”-based, for reports of detrimental effects associated with the materials and processes in question.

There will be a need to understand the intended facility as well as possible (both in terms of structure and function) and to use professional judgement, based on the available information, as to the likelihood of adverse effects occurring.

The process of anticipating impacts parallets that for ecosystem or broader environmental health impact assessment. But, we are dealing with a more clearly defined and more highly exposed population, operating in an environment that is inherently more controllable than the outdoor one. Where the type of facility in question has already been established and is operating elsewhere, the "borrowing" of exposure data from them (which may be possible as a professional courtesy, even between representatives of companies that are commercial competitors on a different level) can be very effective at anticipating and preventing contamination problems.

Mathematical and/or physical modelling may be useful, particularly, in cases where there are adequate data. As well, there are many desirable design characteristics presented in standard reference materials such as in the American Conference of Governmental Hygienists (ACGIH) Industrial Ventilation - Handbook of Recommended Practice.

Pitfalls of occupational hygiene in HIA

The pitfalls are associated with uncertainty, as in all Health Impact Assessments. There is a need to collect data; it may be unavailable, or old, or prepared by individuals with the lack of the necessary knowledge and insight.

Similarly, there is a need to use professional judgement. Although there is accreditation of the professional occupational hygienist by the CROH in Canada, there are only a few hundred ROHs in Canada.

Differences of opinions and approaches to occupational hygiene often reflect academic backgrounds: physicians referr to traditional diseases and public health inspections (sanitary chemistry, sanitary microbiology, water chemistry), while scientists refer to drinking water quality, air pollution, noise pollution and socioeconomic conditions.

A TWA is simply the "average" exposure over the working day. The TWA numerical limits that are listed assume that there is an 8 hour exposure. If worker exposure occurs over a longer period and/or there isn't a 16 hour period between exposures, then adjustments may have to be made to these values from a legal standpoint and /or to conform to fundamental toxicological principles. It's amazing how many industrial sites "overlook" this factor.

In addition to the TWA, there may be specific "short term" exposure (e.g. STEL) and "ceiling" (C) limits. The intent may be either to limit irritative effects, acute systemic health effects, and/or the ability of peak exposures to overwhelm the body's defence mechanisms. The ACGIH also have "generic" excursion limit rules: worker exposures may exceed 3 times the TWA for no more than 30 minutes in any work day, and may not exceed 5 times the TWA at any time (effectively a 'default' ceiling).

Guidelines on the Selection of an Occupational Hygiene Specialist:

These guidelines describe personnel accreditation standards that exist in the occupational hygiene field, to assist the employer with the effective selection of appropriate specialist

personnel. They may be useful in considerations both for staff positions, and in the case of project-specific third-party contractors ("consultants"). It is recognized that, as generic guidelines, they are more likely to be generally applied to the latter, and that is their primary intent. In the case of a staff position, the employer may have more need and leisure to consider the nature of individual candidates, and the likely ramifications of requiring specific qualifications, or not.

The occupational hygiene capabilities of industry (as well as commercial or institutional workplaces), and the quality of work undertaken within the realm of occupational hygiene, are key to the prevention of diseases, disabilities and discomforts of workplace origin. The failure to achieve this is tied to substantial potential liabilities.

Currently, Ministry of Labour (MoL) field hygienists are focusing on the core business of that ministry - in their case, enforcement of standards. They no longer provide hygiene services to the workplace, but would expect employer self-reliance, with emphasis on the internal responsibility system (IRS). As a result, many employers may well need to seek specialist services provided by safe workplace associations, health clinics or private service providers.

This document is intended to provide workplace parties with background and guidance in selecting occupational hygiene assistance.

The Need

Employers are expected to address diverse hazards, under occupational health and safety (OH&S) legislation. The OH&S Act requires that an employer "acquaint a worker ... with any hazard in the work", and specifically with respect to biological, chemical and physical agents.

The Regulation respecting control (for example) requires that employers take "all measures reasonably necessary in the circumstances to protect workers from exposure", and specifically, to maintain exposures within the prescribed limits.

Clearly, fulfilling these responsibilities carries with it specialized administrative, professional and technical abilities that are not all within the skill set of the typical employer or workplace. Some of the professional specialties that are necessary in order to have healthy and safe workplaces are defined in provincial statute, for instance, architects, engineers and doctors. Others are clearly established by licensing provisions (e.g. electricians). However, the various specialists who function in the OH&S field, and are integral to a comprehensive and effective health and safety programme, namely, in safety, ergonomics and hygiene, are not defined.

In selecting an individual to perform a role in occupational hygiene, the employer is bound by "due diligence" considerations and "general duty" provisions. In the case of someone who is also appointed to a supervisory position, the onus rests with the employer that this be a "competent person".

What are the consequences if the employer selects someone who does not have the knowledge and skill sets necessary to provide occupational hygiene services for the matter at hand, and the work is done in a manner that places one or more workers at risk? Not only may the worker(s) experience adverse consequences, but the employer faces a liability under the OH&S Act. Conversely, less qualified hygienists may compensate for their uncertainty in making a judgement call by inflating the safety factors inherent in their recommendation(s), thereby resulting in unnecessary cost to the employer.

Ministry of Labour (MoL) staff may be better able to accept a report of work performed by qualified personnel, based on some confidence that it was apparently conducted in

accordance with "generally accepted standards of occupational hygiene practice". Thus, ensuring that the work is done appropriately initially, means that it would not have to be repeated, at additional cost.

Accordingly, it is in everyone's best interests if those performing occupational hygiene functions are before-the-fact demonstrably qualified, based on a review by a recognized Board (see below). Occupational hygiene service providers should also be members of a professional association that maintains standards of competence, and provides for the accountability of its members e.g. sanctions in the case of disregard for the code of ethical conduct.

Meeting the Need

To determine if you require occupational hygiene expertise, consider questions such as:

- Is your potential need based on a MoL order; if so, did they advise or specify what type of consultant you should seek?
- Do you require assistance with some aspect of the work environment as it relates to worker health?
- Are you interested in determining the likelihood that a particular job or work area will lead to a health problem?
- Do you have workers who are experiencing vague or specific health effects, or who have particular concerns regarding the healthiness of their work environment?
- Do you wish to determine the airborne level of a specific contaminant under certain work conditions?

An affirmative answer to any of these would suggest that you need someone with expertise

in occupational hygiene.

This could be a hygienist or technologist, and either accredited by a recognized hygiene board, or not. When should it be a hygienist? A distinction could be made on the basis of the need for "professional judgement", depth of knowledge, problem solving ability, integrative and communication skills and, holistic programmes, involving multi-disciplinary considerations. Collection and computation of data are commonly considered to be technical functions, whereas interpretation and recommendations on their basis are considered to be professional functions.

Depending on the complexity of the situation, you may need to draw upon specific expertise in disciplines such as ergonomics, health physics or microbiology. This may be provided by hygiene practitioners with specialized skills or, the hygienist may recommend the involvement of personnel dedicated to that particular field. Similarly, the hygienist may advise you to involve a physician, nurse, epidemiologist or engineer, in their area of expertise.

Accredited Occupational Hygiene Specialists

Accreditation is a recognition of an individual's knowledge and ability in a wide range of occupational hygiene skills. Any one accredited individual is not necessarily the most knowledgeable or capable candidate for a particular position or project. Other important criteria in selecting a suitable candidate are not dispensed with by accreditation: knowledge of a specific industry, process or work site; professional referrals from colleagues; a formal statement of qualifications; written proposals to perform designated work in a specified manner.

By selecting an accredited occupational hygienist, assuming that you have verified that other

characteristics of the individual are acceptable, you are protecting yourself, the company, the workers and society at large. You have accepted the decision of a professional association, that has pre-qualified someone who has demonstrated the requisite characteristics to be designated as an accredited occupational hygienist. However, you still have to satisfy yourself that this individual has the capabilities to meet your particular needs with respect to timelines, corporate and worker interface, comprehensiveness of project and product, integrity by reputation, etc. as you would for any consultant or contract employee.

There are two generally-recognized North American hygiene accreditations, those offered by the Canadian (CRBOH[2]) and the American (ABIH[3]) Boards. Information / rosters for each of these will be found on their respective web sites:

- http://www.CRBOH.ca
- http://www.ABIH.org

Accreditation is awarded to hygienists on the basis of successfully meeting educational, professional experience and examination criteria. The fundamental requirements of the two Boards are similar.

The CRBOH and ABIH/BCSP[4] also offer accreditation of technologists, with the designations "ROHT" ("Registered Occupational Hygiene Technologist") and "OHST" (Occupational Health and Safety Technologist), respectively. Here again, these are individuals who have been evaluated by a professional association and have been granted their designation in accordance with the criteria of the respective Board.

Unaccredited Occupational Hygiene Personnel

[2] Canadian Registration Board of Occupational Hygienists, which offers services in English and French

[3] American Board of Industrial Hygiene

[4] Board of Certified Safety Professionals

Anyone may call themselves an "occupational hygienist"; there is no legal protection of the use of the term. Consultant directories, as published by the Occupational Hygiene Association of Ontario (OHAO - Tel: 905 567 7196) and the American Industrial Hygiene Association (AIHA -Tel: 703 849 8888) include some of those who offer services in occupational hygiene; these may or may not be accredited individuals. Unaccredited personnel may be quite competent; you may, in fact, find an unaccredited specialist who is more qualified by experience with respect to your specific needs than a typical accredited specialist. Just as with accredited hygienists, a formal reference may be useful. Errors and omissions insurance may also be considered a positive attribute. However, if you choose to use the services of unaccredited personnel, the onus is on you to determine the suitability of their hygiene-specific credentials and capabilities.

Accordingly, occupational hygiene projects in which accreditation is thought to be particularly compelling, have been listed below.

Does the occupational hygiene work involve, or is it being initiated as a result of:

- the laying of charges
- a Ministry of Labour order (or other deficiency, noted)
- a prescribed assessment
- a health-based formal work refusal
- other questions of compliance, or matters that may end up in litigation
- testimony as an expert
- a facility audit (or project, design, process or purchase review) requiring anticipation and/or recognition of health hazards, and/or leading to
- identification of critical / likely contaminants and significant exposure scenarios (i.e.

risk assessment)

- exposure to new, developmental or poorly characterized environments and/or contaminants (e.g. those without a regulatory exposure limit)
- concurrent exposure to multiple contaminants, or involving multiple media
- (potential) exposure to serious contaminants with irreversible effects such as carcinogens, mutagens, reproductive toxicants, sensitizers
- exposure that shows significant (e.g. more than 10-fold) temporal and/or spatial variability
- a situation in which health effects are occurring, or symptoms are being reported
- an evaluation pursuant to a workers' compensation claim
- development of a control programme:
  - hearing conservation
  - respiratory protection, or other Personal Protective Equipment
  - designated substances
- a multi-professional (physician, engineer, etc) undertaking
- development of an occupational hygiene training programme
- auditing an existing occupational hygiene programme.

If so, it would be particularly advantageous to engage the services of an accredited occupational hygienist, to maximize the protection of all concerned. Selecting an accredited individual provides the employer with a measure of assurance based on the recognized Board's certification and maintenance protocols.

Sources of Information

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Web site addresses (URLs)

Health Canada:	http://www.hwc.ca/search/iaquery
Ontario Ministries:	http://www.gov.on.ca
Labour:	http://www.gov.on.ca/LAB/main.html

Integrated Risk Information System (IRIS), prepared and maintained by U.S. EPA; electronic data base containing information on human health effects that may result from exposure to various chemicals in the environment. The information in IRIS is intended for those without

extensive training in toxicology, but with some knowledge of health sciences.

http://www.epa.gov/ngispgm3/iris

NIOSH Home Page http://www.cdc.gov/niosh/homepage.html

Mining Health and Safety Research - Pittsburgh and Spokane Research Centres (NIOSH)

http://www.usbm.gov/

Coal Mining Photo Series http://www.-busph.bu.edu/Gallery/Gallery-Lobby.nclk

IARC: http://www.iarc.fr/

World Health Organization http://www.who.ch/

Implementing an Environmental Management System (ISO 14 000)

http://www.ait.ac.th/AIT/som/as/ISO14k/welcome.htm

Dieselnet http://www.dieselnet.com/

Resources and information about Environmental and Occupational Health; hundreds of files from the University of Edinburgh

http://www.med.ed.ac.uk/hew/

Occupational and Environmental Medicine WWW Resource Index (external links from the OEM/Duke pages)

http://gilligan.mc.duke.edu/oem/index2.htm

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