Core Competencies Defined

- **Administrative Controls** - Administrative controls change the way people work. IHs/OHs should know how work practice controls such as changes in work procedures (e.g., safe work practices, job hazard analyses), supervision, timing of work (i.e., schedules), and training may be applied to reduce the duration, frequency, and severity of exposure to workplace hazards.
- **Chemical Sampling and Instrumental Analysis** - The IH/OH should develop appropriate sampling strategies. This includes being able to select and describe the advantages and disadvantages of using the various types of sampling instruments, such as active, passive, and real time detection instruments, and the collection of personal full-shift, task-based, area, and grab samples. The IH/OH should be able to describe the principles and application of laboratory analytical procedures and identify the appropriate methods of detection for sample analyses (e.g., gas chromatography, spectrophotometry, atomic absorption spectrophotometry, etc.). Important elements of sampling and analysis are demonstrating knowledge of instrument calibration and evaluating both the proactive and the reactive quality assurance practices in the field and in the lab.
- **Biological Hazards** - The IH/OH should recognize biological agents associated with potential occupational and nonoccupational exposure to viruses, bacteria, fungi, molds, allergens, and toxins from biological sources, bloodborne pathogens, and infectious diseases that are potentially harmful to humans and other biological organisms. Once identified, the IH/OH should be able to evaluate the potential exposures to these biohazards and recommend controls to reduce or eliminate exposures.
- **Biostatistics and Epidemiology** - Statistical analysis is key to understanding large data sets (e.g., exposure monitoring) and discovering underlying patterns and trends. The IH/OH should be able to understand, apply, interpret, and draw conclusions from descriptive and inferential statistics. These same concepts are also applied in epidemiology, and the IH/OH should be able to demonstrate knowledge of the principles and techniques used to study the distribution of occupationally induced diseases, physiological conditions, and factors in workplaces and other environments that influence their frequency. This may include interpreting and evaluating prospective and retrospective epidemiology studies, morbidity, and mortality data, and integrating knowledge applicable to human health from toxicology studies (e.g., in vitro studies and computer modeling).
- **Career Development Pathways** - The structured progression of knowledge, skills, and experiences that enable OEHS professionals to advance across technician, practitioner, and professional levels, supporting growth in technical, management, and leadership competencies through education, mentoring, and applied practice.
- **Chemical Hazards** - The IH/OH should be able to apply scientific and technical knowledge to minimize the potential for human exposure to chemical agents, in all phases, in the occupational and non-occupational environment with emphasis on exposures related to work. IHs/OHs specify approaches to anticipate, recognize, evaluate, and control chemical exposure via all routes of entry into the body. IHs/OHs should be able to identify a wide range of health effects from chemical exposure ranging from acute (e.g., irritation, toxicity) to chronic (e.g., sensitization and carcinogenicity). IHs/OHs should also be able to recognize physical hazards of chemicals such as flammability, combustibility, and explosivity and be familiar with chemicals which may cause simple or chemical asphyxiation.
- **Community Exposure** - The concepts practiced in IH/OH also apply to community exposures to health hazards to both chemicals and noise. The IH/OH should be able to describe general and technical topics related to ambient air quality, air cleaning technology, emission source sampling, atmospheric dispersion of pollutants, ambient air monitoring, and health and environmental effects of air pollution. The IH/OH should be familiar with peripheral disciplines such as emergency planning and response, water pollution, hazardous waste, and environmental fate and transport to provide support to others working in those areas. The IH/OH should be familiar with any local community noise standards, the methodology for performing community noise surveys, and appropriate mitigation controls.
- **Engineering Controls and Ventilation** - The IH/OH should be able to evaluate the need for, recommend and apply engineering controls including local exhaust ventilation, dilution ventilation, isolation, shielding, and interlocks to control chemical, biological, and physical exposures. The IH/OH should be knowledgeable about the mechanics of airflow, air circulation and recirculation, ventilation design, and types and applicability of local exhaust ventilation systems and devices, ventilation measurement equipment and methods, air cleaning technology, lower and upper explosion limits, and calculation methods.
- **Ergonomics** - The IH/OH should be able to identify, evaluate, and recommend controls to mitigate jobs with ergonomic hazards to prevent injuries and illnesses and improve the efficiency and comfort of workers. The IH/OH

should be knowledgeable about the principles of anthropometry, human factors engineering, biomechanics, work physiology, human anatomy, and facilities engineering and be familiar with and able to use ergonomic assessment tools and equipment.

- **Exposure Assessment** - The systematic process of identifying, measuring, and evaluating worker exposures to chemical, physical, and biological hazards—characterizing the magnitude, frequency, and duration of exposures to inform risk assessment and guide effective control strategies.
- **Fatigue Management** - IHs/OHs need to understand the scientific basis of fatigue, sleep cycles, circadian rhythms and fatigue physiology and be familiar with the risk factors associated with fatigue and their appropriate mitigation.
- **Functional Core Competencies** - "Soft skills" that help to make an IH/OH successful at all career stages including : Business Literacy, Collaborative Teamwork, Communication, Confidentiality, Creative Thinking/Innovation, Emotion Intelligence, Influencing/Advocacy Skills, Leadership/Management, Lifelong Learning, Listening Skills, Negotiation Skills, Problem-Solving, Professional Demeanor, Project Management, Relationship Building, and Strategic Thinking.
- **Hazard Communication** - The process of identifying, documenting, and effectively communicating information about workplace hazards and associated risks to workers and stakeholders, ensuring understanding of safe work practices, protective measures, and regulatory requirements.
- **Health Regulations** - Most countries and states/provinces have health protection laws and regulations IHs/OHs should be familiar with for their local jurisdiction. For example, in the US, the Occupational Safety and Health Act (OSH Act) is the law empowering the Occupational Safety and Health Administration (OSHA) to promulgate regulations for health and safety hazards and specify actions employers should take to protect workers. The Health & Safety Executive (HSE) serves a similar role in the UK. IHs/OHs should be able to understand and interpret applicable regulations so they can develop, implement, and manage workplace programs to ensure compliance. IHs/ OHs should also be familiar with consensus standards (e.g., ANSI, ISO) which are cited in many of the regulations.
- **IH/OH Program Management** - An effective IH/OH should be able to apply methods to acquire and manage resources to anticipate, recognize, evaluate, and control workplace hazards. This includes understanding and applying principles of collaborative problem- solving, cost-benefit analysis, auditing, investigation methods, data management and integration, establishment of policies, planning, delegation of authority, accountability, business acumen, risk communication, organizational structure and culture, worker training, and decision-making. The IH/OH should possess the ability to recognize system- level properties resulting from dynamic interactions among human and social systems and how they affect the relationships among individuals, groups, organizations, communities, and the environment.
- **Indoor Air Quality** - The IH/OH should understand how air quality within and around structures can affect the occupants' health and comfort. The IH/OH should be knowledgeable of the factors affecting Indoor Air Quality (IAQ) including interior and exterior sources of contamination, building envelope issues, poor temperature and relative humidity regulation, ventilation, and inadequate air flow including insufficient outside air. The IH/OH should be knowledgeable in the terminology and basic operational concepts associated with building systems designed to provide building IAQ. The IH/OH should be familiar with common sources of IAQ problems such as chemicals, building materials, mold, bacteria, and construction activities. The IH/OH should be proficient in the selection and use of IAQ instrumentation and the data they provide. The IH/OH should work with the facility engineers and maintenance personnel to help solve IAQ issues.
- **Laboratory Quality Assurance/Quality Management** - The development, implementation, and continuous improvement of laboratory systems, processes, and procedures to ensure the accuracy, reliability, integrity, and defensibility of analytical results, including adherence to quality standards, proper documentation, and evaluation of data through recognized quality control practices.
- **Noise and Hearing Loss Prevention** - The IH/OH should be able to demonstrate knowledge and apply principles of the physics of noise to conduct appropriate measurements to evaluate worker exposure, identify situations with the potential to cause noise-induced hearing loss, and recommend methods to eliminate or control excessive exposure including both engineering controls and personal protective equipment. The IH/OH should be able to recognize ototoxicants and the risk of exposure. The IH/OH should also demonstrate knowledge of the anatomy and physiology of the ear regarding hearing and the development of hearing loss. The IH/OH should be able to understand how to calculate standard threshold shifts, as defined by applicable regulations, evaluate audiometric testing programs, and work closely with those who administer the audiometric testing.
- **Personal Protective Equipment** - The IH/OH should understand that personal protective equipment (PPE) should be considered the last line of defense, as a temporary measure until engineering controls can be installed, or as a

supplement to other controls. IHs/ OHs recommend and evaluate use of PPE to control exposures and provide guidance on the selection, use, care, and limitations of the equipment. The IH/OH should be knowledgeable about types of respirators, respirator fit testing, breathing air specifications, types and configurations of skin protection, material permeability, hearing protection, hearing protection fit testing, and eye protection.

- **Psychosocial hazards** - The identification, evaluation, and management of workplace factors related to how work is organized, designed, and managed—including social, organizational, and interpersonal conditions—that can negatively affect worker mental and physical health, safety, and organizational performance
- **Radiation (Ionizing and Nonionizing)** - IHs/OHs should be knowledgeable about radiation and its hazards relative to human health. IHs/OHs should be able to apply knowledge of ionizing radiation including the physical characteristics and the health and biological effects associated with exposure to alpha, beta, gamma, neutron, and x-radiation. IHs/OHs should be familiar with the regulatory requirements associated with the use of radioactive materials and radiation-producing equipment. IHs/Ohs should be able to apply knowledge of non-ionizing radiation including the physical characteristics, hazards, and health effects associated with exposure to electromagnetic fields, static electricity and magnetic fields, lasers, radio frequencies, microwaves, ultraviolet, visible, infrared radiation, and intense light sources. For all radiation, IHs/OHs should understand the measurement and monitoring methods needed to perform exposure evaluations and be able to recommend controls.
- **Risk Assessment** - Risk assessment includes both assessment of the hazards and an assessment of the exposure to those hazards. Then, the IH/OH characterizes the risks and determines what is acceptable and what is not acceptable. The hierarchy of controls is applied, with the support of the line organization, to reduce risks to acceptable levels. In addition to a basic understanding of the operational and business processes, the IH/OH should demonstrate knowledge of the principles of health risk analysis including: establishing an exposure assessment strategy, collecting basic characterization information (workplace, workforce, and agents), assessing exposures to the workforce, prioritizing health risks, estimating (qualitative exposure assessment) or measuring (quantitative exposure assessment) the magnitude, frequency, and duration of exposure to a hazard, along with the number and characteristics of the population exposed, and describing the sources, pathways, routes, and the uncertainties associated with the assessment.
- **Risk Communication** - The clear and effective communication of health risk information, hazards, and control measures to workers and all levels of the organization, including providing training to ensure understanding and support safe work practices.
- **Risk Management** - The process of applying exposure assessment findings to develop, implement, and evaluate control strategies and programs in collaboration with organizational stakeholders to reduce risks and protect worker health and safety.
- **Safety** - The systematic identification, evaluation, and control of workplace hazards to prevent injuries, incidents, and fatalities, and to promote safe work practices, behaviors, and environments that protect workers and organizational performance.
- **Thermal Stressors** - The IH/OH should have a thorough understanding of heat and cold stressors and their effects on the human body. The IH/OH should be able to identify sources of thermal stressors, determine how to effectively minimize exposures to employees, and provide recommendations for a comprehensive heat and cold stress management program. The IH/OH should be able to communicate thermal stress hazards to employees to recognize and prevent thermal stress emergencies such as heat stroke and hypothermia.
- ***Total Worker Health®*** (TWH) - is a holistic approach to improving worker health, safety, and well-being and advances worker health, safety, and well-being through integrated cross-organizational interventions, and participatory engagement of workers. It goes beyond traditional occupational health and safety by focusing on other health risk factors and health influences arising outside of the workplace including work and non-work demands and considerations as shown in Figure 5. IHs/OHs should be knowledgeable of the concepts of the TWH approach and be able to work with Occupational Health, Human Resources, management and workers to identify and minimize risk factors to improve worker well-being (e.g., the impact of social determinants of health (SDOH) on occupational health inequities).
- **Toxicology / Human Disease** - The IH/OH should demonstrate knowledge of the principles of toxicology, including exposure and dose; routes of entry; acute versus chronic toxicity; local versus systemic events; reversible and irreversible effects; the dose-response relationship; and toxicological risk. In addition, the IH/OH should be familiar with the methods for the classification of toxic agents including knowledge of target organs, toxic potency, and methods of action. The IH/OH should be able to apply the toxicological principles to evaluating and predicting health

effects from exposures to single contaminants, mixtures of contaminants, and natural and synthetic agents. This involves being familiar with various acute and chronic human disease pathologies (e.g., irritation, fibrosis, mutations, carcinogenic mechanisms, and genetic damage) and being able to relate these pathologies to occupational exposures.

- **Work Environments, Occupations, and Industrial Processes** - To be effective, the IH/OH should be able to anticipate, recognize, evaluate, control, and confirm workers' and others' exposures associated with specific industries, occupations, and/or processes. This requires applying knowledge and skills to address hazards that can potentially cause related diseases and/or dysfunctions from exposures such as confined space entry, spray painting, welding, abrasive blasting, vapor degreasing, foundry operations, hazardous waste site remediation, 3D printing, academic laboratories, healthcare, and indoor environmental conditions.

Core Competencies – Topical Relationships

- Administrative Controls
    - Elimination and Substitution
- Air Sampling and Instrumental Analysis
- Biological Hazards
    - Biosafety
    - Biological Monitoring
- Biostatistics and Epidemiology
- Career Development Pathways
- Chemical Hazards
- Community Exposure
    - Emergency Response
    - Emergency Preparedness
    - Industrial Accidents
- Engineering Controls and Ventilation
    - Prevention through Design (PtD)
- Ergonomics
- Exposure Assessment
    - Qualitative Exposure Assessment
    - Quantitative Exposure Assessment
    - Exposure Limits
    - Exposure Banding
    - Exposure Modeling
    - Statistical Tools
    - Improving Exposure Judgment
    - Dermal Exposure Assessment
- Fatigue Management
- Functional Core Competencies
    - Business Literacy
    - Collaborative Teamwork
    - Communication
    - Communicating OEHS Concepts
    - Confidentiality
    - Creative Thinking/Innovation
    - Emotional Intelligence
    - Influencing/Advocacy Skills
    - Leadership/Management

    - Lifelong Learning
    - Listening Skills
    - Negotiation Skills
    - Planning And Organization
    - Problem-Solving
    - Professional Demeanor
    - Project Management
    - Relationship Building
    - Strategic Thinking
- Hazard Communication
    - Globally Harmonized System (GHS)
    - Safety Data Sheets (SDS)
- Health Regulations
    - Occupational Health & Safety Act
    - Regulation and Legislation
    - Consensus Standards
    - Exposure Limits
- IH/OH Program Management
    - Business Case Development
    - Changing Work Dynamics
    - Value of Profession
    - Human Capitals
    - Ethics
    - Data Management
    - Big Data
    - Occupational Health Disparities
- Indoor Air Quality
- Instrumentation
    - Real-time Detection Systems
    - Sampling Equipment
    - Sensor Technologies
- Laboratory Quality Assurance/Quality Management
- Noise and Hearing Loss Prevention
- Personal Protective Equipment
- Psychosocial hazards
- Radiation (Ionizing and Nonionizing)
- Risk Assessment

- Risk Communication
- Risk Management
- Safety
- Thermal Stressors
- *Total Worker Health* ®
- Toxicology / Human Disease
- Vibration
- Work Environments, Occupations, and Industrial Processes
    - Confined Space Entry
    - Spray Painting
    - Welding
    - Cannabis Industry
    - Abrasive Blasting
    - Vapor Degreasing
    - Foundry Operations
    - Hazardous waste site remediation
    - 3D Printing
    - Academic Laboratories
    - Healthcare
    - Indoor Environmental Conditions