

CURRICULUM, TRAINING AND ASSESSMENT GUIDE

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PURPOSE OF GUIDE

This Guide is designed for SSG's Training Providers (TP) and Adult Educators who are responsible for the design and delivery of programmes within the Specialist Diploma in Occupational Hygiene of the WSQ Occupational Hygiene (OH) Professionals Framework. This Guide aims to provide essential curriculum, training and assessment design advisory information, to guide developers, trainers and assessors in the interpretation and translation of competency standards into training and assessment programme. The Guide also contains training and assessment requirements stipulated by industry, and WSQ accreditation information for compliance. It is divided into 3 parts:

- Part I -** Provides an overview of the domain of Occupational Hygiene, the OH Professionals WSQ framework and the WSQ Specialist Diploma in OH qualification
- Part II -** Provides unit specific information, key delivery and assessment advice, equipment list and adult educator requirements for this competency unit under the OH Professionals WSQ framework
- Part III-** Provides a broad spectrum of information pertaining to the mandatory sections and includes the supporting information and documents related to this competency unit

PART I

CHAPTER 1: OVERVIEW OF OCCUPATIONAL HYGIENE

This chapter describes the overview and nature of Occupational Hygiene (OH), covering the following key components:

1.1 Domain of Occupational Hygiene

Occupational Hygiene (OH) is the practice of:

- Anticipating and recognising hazardous agents in the workplace that can cause disease or discomfort
- Evaluating the extent of the risks due to exposure to these hazardous agents
- Controlling of those risks to prevent ill-health in the long or short term.

OH issues exist in nearly all workplaces, with varied types of *hazards and risks, where the health of persons at work can be affected due to their occupations. These hazards (also refer to as “stressors”) may be divided into the categories Physical, Chemical, Biological, Human Factor (Ergonomic) and Psychosocial. The materials and energy that the workers use or handle, and the environment in which they work may expose them to chemical agents, hazardous substances, or physical stressors like noise, heat, radiation, etc; as well as ergonomic and psychosocial stressors arising from the way that their jobs, equipment and workplaces are designed are organised. OH Professionals therefore would be engaged in a wide spectrum of workplaces, where such hazards may be present. These workplaces may include the key industries such as chemical, process, pharmaceutical, manufacturing, healthcare, construction, marine, research and development, etc.

In Singapore’s context, OH Professionals are employed as various “competent persons”, mostly for the compliance with relevant legal requirements that stipulates the requirements for such persons. These include noise monitoring officers, noise control officers, confined space assessors, competent persons for the management of hazardous substances, competent persons for sampling and monitoring of airborne contaminants, etc.

In this sector the main composition of the workforce makes up of professionals, executives, managerial and technicians employed or working in OH related fields.

*The Risk Assessment process should consider the management of infectious disease outbreak, employees’ health (including mental well-being) and terrorist threats. Training Provider should take reference from the 3rd revision of the Code of Practice on Risk Management.

1.2 Skills, Education Profile, Nature of Employment, Typical Occupational Titles in Occupational Hygiene

OH Professionals are people who use scientific methodology in determining hazards, assessing exposure and risks through environmental monitoring and analytical methods to detect the extent of worker exposure and employ engineering, work

practice controls, and other methods to control potential health hazards and risks. The output of their tasks, for example, measurement of concentration of toxic gases, is the basis for decision making on the actions to be taken for the protection of health, or even lives of persons affected.

As for the education profile, majority of them would have at least educational level at diploma and degree in science, engineering, and technical disciplines.

These OH Professionals are employed both in private companies and governmental agencies. Private companies may engage OH Professionals as OH officers, technicians, hygienists, coordinator and manager for monitoring and managing of the occupational hazards at the workplaces. The OH Professionals commonly find themselves employed by consultancy companies and laboratories that provide OH services such as air sampling, noise monitoring, ergonomic assessment etc. The public sector also engages OH Professionals, mostly for policy, directives and regulatory setting, as well as implementation, monitoring and enforcement of regulations in OH.

In their jobs, the OH Professionals involved in managing different occupational health hazards, at different levels of competency may have the job roles or titles such as:

- Occupational Hygiene Officer
- Noise Monitoring Officer
- Noise Control Officer
- Confined Space Safety Assessor
- Workplace Safety and Health Officer
- Hazardous substances permit holder
- Radiation Safety Officer
- L5/L6 (non-NDT work) licensee
- N3 licensee
- HS licensee
- Competent persons for sampling and monitoring of airborne contaminants

1.3 Expected Attitudes of Workers in the Profession

OH Professionals are expected to be self-directed, with an analytical mind and a meticulous approach to problem-solving. They should also be passionate and committed to ethical practice in OH and receptive to change in the light of new evidence.

1.4 Work Conditions and Context of Job Performance

The physical working environment settings of the OH Professionals vary largely according to industry. While OH Professionals may spend a fair proportion of their time in an office environment analysing data, writing reports, maintaining and preparing equipment it is expected of them to be on-site or in field too.

As their job tasks include the recognition, evaluation and control of workplace health hazards, they will be in environments where such hazards are present. For instance, they could be subjected to the heat stresses at the workplace where they are tasked to monitor and control heat stress. Other possible hazards include hazardous substances, radiation, noise, biological agents, flammable substances etc.

In these work environments, OH Professionals need to adhere to the same level of safety and health control measures as the operational staff. This may include wearing the same personal protective equipment, such as protective suits, respirator etc. A basic level of physical fitness is also preferred as the OH Professionals will need to carry and operate tools, instruments and equipment in field work. Working hours can also be irregular at times, for instance, when the sampling plan requires sampling to be taken outside normal working hours, or sampling is required in an emergency situation. However, OH Professionals face lower levels of risk compared to operational staff due to the shorter frequency and duration of exposure.

OH Professionals are also required to continually upgrade their knowledge and skills, keep abreast of developments in the OH field through reading and attending seminars and courses.

1.5 Skills Gaps and Key Challenges Facing the Profession

One of the key challenges in identifying appropriate approaches to tackle workplace health (WH) issues is the unique nature of WH hazards. Since the revamp of the national WSH framework, it was proposed that the local industry should draw from the experiences of leading countries to adopt a more proactive approach based on risk prevention and mitigation. The current focus of local industry's efforts has primarily been on tackling workplace safety lapses, which have an immediate and tangible impact in terms of injuries or fatalities. Due to the long latency and multi-factorial nature of occupational diseases, WH risks are complex and harder to quantify, and would often require higher order skills, which makes it difficult for employers and regulators to measure the impact of poor WH management and to take proactive measures to prevent the onset of ill health.

In addition to that, the domain of OH is currently under-developed with a lack of professionals working in the industry. They mainly reside in large petrochemical companies and pharmaceutical firms, government agency, laboratories and consultancy companies. This can be attributed to the low demand and a lack of emphasis on the importance of occupational hygienists in Singapore. This falls far below that of other developed countries.

As such, the national WH framework was launched to help stakeholders to take proactive measures to improve their management of WH hazards. One of the key strategies identified was the development of OH Professionals to assist employers to improve WH management.

CHAPTER 2: THE OCCUPATIONAL HYGIENE PROFESSIONALS WSQ FRAMEWORK AND WSQ SPECIALIST DIPLOMA IN OCCUPATIONAL HYGIENE

This chapter describes the overview of the OH Professionals WSQ Framework and the Specialist Diploma in OH, covering these components:

2.1 Overview of the Occupational Hygiene Professionals WSQ Framework

The framework's key purpose is, "To drive improvements in workplace health (WH) management and raise WH standards through quality professional development of competent and motivated Occupational Hygiene (OH) Professionals to assist employers, occupiers and other stakeholders in the anticipation, recognition, evaluation and control of Occupational Hygiene risks at the workplace."

A study was also done on the local OH landscape and there were a few courses accredited by the Singapore Ministry of Manpower (MOM) and National Environment Agency (NEA) which were found useful and relevant to this framework.

As such the development of this framework is closely referenced to particular MOM and NEA accredited courses. This framework has been validated and endorsed by industry practitioners and forms the benchmarks for competency-based training and assessment.

2.2 Overview of WSQ Specialist Diploma in Occupational Hygiene

The WSQ OH Professionals Framework consists of a single qualification titled 'WSQ Specialist Diploma in Occupational Hygiene (SDOH).' It is pegged at competency Level 5 in the WSQ Qualification Level system.

With reference to the competency map, a candidate must achieve the Statement of Attainment (SOA) for the competency units under the qualification in order to be awarded the WSQ SDOH which consists of:

- All 8 Core Units;
- 2 Electives Units from Group 1 Elective Units; and
- 1 Elective Unit from Group 2 Elective Units

PART II

CHAPTER 3: UNIT-SPECIFIC INFORMATION: CONTROL NOISE AND VIBRATION

3.1 Purpose and Focus of Competency Unit

On completion of this unit, the learner will have the knowledge and be equipped with the application skills in control noise and vibration and be able to apply them at the workplace. This includes:

- Apply the basic principles in noise and vibration control
- Provides the fundamental knowledge and skills in noise and vibration control
- Typical control measures and assessment of these control measures' effectiveness.

3.2 Target Audience

The target audience of this competency unit may include:

- Workplace Safety and Health (WSH) professionals such as WSH Coordinators, Officers, and Auditors
- Occupational Hygiene (OH) professionals such as OH Technicians
- Occupational health professionals such as occupational health nurses and physicians
- Other professionals in OH-related fields such as ergonomics, human factors, occupational psychology, noise monitoring and control, acoustics, as well as engineering and facility management specialists require knowledge on the control of noise and vibration at the workplace
- Persons who want to be recognised by the Singapore Ministry of Manpower to advice occupiers and employers on noise control in factories and workplaces
- Persons who have completed the unit on Monitor Noise and Vibration.

Pre-requisites

Learners who want to undertake this unit must have successfully completed the MOM approved "Noise Monitoring Course" or the competency unit of "Monitor Noise and Vibration" under this framework.

3.3 Recommended Learning Hours (RLH)

This section proposes the total hours of competency-based training and assessment for one of the core **Competency Unit: Control Noise and Vibration** taking into account the time required for directed learning activities. Directed learning is broadly defined as trainer/assessor-directed & purposefully instructed to trainees to complete as part of instructional design of a structured training & assessment programme.

The specification of the RLH for **Competency Unit: Control Noise and Vibration** is **24 hours**.

3.4 Credit Exemption

Candidates who have successfully undertaken the MOM accredited course titled “Industrial Noise Control Course” will be granted unit exemption for this WSQ unit. Documentary evidence will have to be submitted to the training provider before exemption can be granted.

CHAPTER 4: KEY DELIVERY ADVICE

This chapter describes the following components for one of the core **Competency Unit: Control Noise and Vibration** only.

4.1 Content Coverage

In developing the programme for this **Competency Unit: Control Noise and Vibration**, TPs should always make cross references to the Performance Statements (PS), Underpinning Knowledge (UK), Range of Application and Evidence Sources sections as stipulated in the said unit. Depending on the context, as a guide, at least 50% of the Range of Application should be covered.

Individuals taking this competency unit may come from the different organisations from various key industries. TPs are advised to contextualise their programmes to better cater to trainee needs, based on the organisation that they come from. Contextualisation of the programme content normally revolves around the range of application of the competency unit.

4.2 Sequence of Coverage

Performance Statements	Underpinning Knowledge *
<ul style="list-style-type: none">Establish the objectives for noise and vibration control in accordance with workplace noise and vibration-related legal and other requirements.	<ul style="list-style-type: none">Objectives of noise control (Synthesis)Workplace noise and vibration-related legal and other requirements (Application)
<ul style="list-style-type: none">Determine the characteristics of the noise and vibration hazard sources for the purpose of noise control in accordance with recognised standard measurement methods and equipment.	<ul style="list-style-type: none">Noise and vibration sources (Comprehension)Measuring acoustic properties (Mechanism)Equipment used for measurement (Application)Standard measurement methods of noise and vibration hazard (Application)
<ul style="list-style-type: none">Analyse the characteristics of noise and vibration sources for the identification of possible control approaches.	
<ul style="list-style-type: none">Determine the control methods for noise and vibration hazards in accordance with the hierarchy of control.	
<ul style="list-style-type: none">Advise the stakeholders on the implementation of noise and vibration control process	<ul style="list-style-type: none">Control approaches (Evaluation– strategy or priority and procedure (Evaluation)

at different phases of control.	<ul style="list-style-type: none"> • Control methods for noise and vibration hazards (Evaluation) • Hierarchy of control (Application) • Phase of control (Application)
<ul style="list-style-type: none"> • Evaluate the effectiveness of noise control measures in meeting the control objectives. 	<ul style="list-style-type: none"> • Methods to evaluate effectiveness of control (Evaluation) • Occupational Noise and Vibration Exposure Limits (Application)

* The verb in the bracket “()” after each underpinning knowledge indicates the cognitive level using Bloom’s Cognitive Domain.

Learners in this unit should have completed the unit on “Monitor Noise and Vibration” prior to taking up this unit as the basic knowledge and skills such as noise measurement, acoustic principles etc will not be taught again in this unit. Some learners may come with experience in noise monitoring and are familiar with the skills of use of measuring equipment. The adult educator may adjust the flow and advance of the class based on assessment on the learner prior knowledge and skills.

Range of Application

Ranges, contexts or circumstances under which competent performance may be demonstrated. It gives further references to specific areas or terms in the Performance Statements and Underpinning Knowledge

Objectives for noise and vibration control

Establish the objectives of noise and vibration control, which may include:

- Comply with legal requirements
- Comply with organisational requirements
- Reduce risks of noise induced deafness
- Productivity improvement
- Address concerns and complains of stakeholders, which may include:
 - Employees
 - Unions
 - Contractors
 - Neighbours
 - The public

Workplace noise and vibration-related legal and other requirements

Identify and apply relevant legal requirements, which may include:

- Workplace Safety and Health Act
- Workplace Safety and Health (Noise) Regulations
- Factories (Medical Examinations) Regulations
- Environmental Protection and Management Act
- Environmental Protection and Management (Boundary Noise Limits for Factory Premises) Regulations

Other requirements, which may include:

- Singapore Standards

Range of Application

Ranges, contexts or circumstances under which competent performance may be demonstrated. It gives further references to specific areas or terms in the Performance Statements and Underpinning Knowledge

- CP 99: 2003 Code of practice for industrial Noise Control
- Code of Practices, which may include:
 - SS 549: 2009 Code of practice for the Selection, Use, Care and Maintenance of Hearing Protectors (Approved Code of Practices)
- MOM Guidelines for Noise Control and Vibration
- MOM Guidelines on Hearing Conservation Programme
- Industrial guidelines and standards
- Corporate requirements

Characteristics of the noise and vibration hazard sources

Characterise the noise and vibration sources, which may include:

- Conducting a noise survey
- Measuring acoustical properties of noise sources, which may include:
 - Overall A-weighted sound level
 - Peak value
 - Frequency spectrum
 - Broadband sound level vs time for cyclic or fluctuating noise source
 - 1/3 octave band
 - Full octave band
- Information on room characteristics

Noise and vibration sources

Identify noise and vibration sources, which may include:

- Machines, which must include:
 - Wood working machinery
 - Metal working machinery
- Electric motors / engines
- Industrial fans or blowers
- Compressors
- Generators
- Pumps
- Hydraulic systems
- Mechanical impacts
- Panel or structure
- Nozzle

Determination of acoustic properties of the noise sources

Determination of acoustic properties of noise sources, which may include:

- Selecting the appropriate equipment
- Calibrating the equipment
- Taking measurements at appropriate timings and locations
- Recording the measurement results

Standard measurement methods of noise and vibration hazards

Range of Application

Ranges, contexts or circumstances under which competent performance may be demonstrated. It gives further references to specific areas or terms in the Performance Statements and Underpinning Knowledge

Apply standards, which may include:

- Methods as stipulated in the legal requirements and guidelines, which must include:
 - Workplace Safety and Health (Noise) Regulations
 - Guidelines on Noise and Vibration Control (MOM)
 - Guidelines on Noise Labelling (MOM)
- Methods developed by recognised occupational hygiene institutions and professionals, which may include:
 - Occupational Safety and Health Administration (OHSA, USA)
 - National Institution of Occupational Safety and Health (NIOSH, USA).
- American Conference of Governmental Industrial Hygienists (ACGIH, USA)

Equipment used for measurement

Equipment used, which may include:

- Sound level meter (Type I and II)
- Vibration Analyser
- Acoustical calibrator
- Frequency analyser
- Real-time analyser
- Integrating sound level meter
- Noise dosimeter

Analyse the characteristics of noise and vibration sources

Analyse the characteristics of noise and vibration sources, which may include:

- Analyse the graphs for the frequency spectra
- Compare frequency data from similar processes, equipment and tools
- Compare frequency data with components isolated, where possible
- Analyse frequency spectrum and broadband sound level
- Calculate noise reduction from noise control measures, which may include:
 - Barriers
 - Enclosures
 - Partitions
 - Room absorption
 - Vibration absorption

Noise and vibration control approaches

Noise and vibration control approaches, which may include:

- Control at source
- Control at transmission path
- Control at receiver, which may include:
 - Personal enclosure
 - Use of hearing protectors

Range of Application

Ranges, contexts or circumstances under which competent performance may be demonstrated. It gives further references to specific areas or terms in the Performance Statements and Underpinning Knowledge

- Hearing conservation programme

Control methods for noise and vibration hazards

Control methods for noise and vibration hazards, which may include:

- Acoustical materials, which may include:
 - Transmission loss
 - Mass law
 - Absorption coefficient
- Acoustics barrier
- Partition wall
- Acoustic enclosures, which may include:
 - Total
 - Partial enclosures
 - Personal enclosure
- Control of noise from vibrating surfaces
- Control of noise from material handling
- Silencers and mufflers
- Improving the balance of a rotating mechanism
- Active noise control
- Reverberation control (room treatment)
- Vibration control, which may include:
 - Hand-transmitted and whole-body vibration
 - Damped and un-damped vibration
 - Selection of vibration isolators
- Environmental and community noise control
- Occupational noise and vibration control programmes, which may include:
 - Occupational noise survey
 - Occupational vibration survey
 - Noise and vibration control assessment and design
 - Noise modelling and prediction
- Personal protective equipment programmes

Hierarchy and phases of control

Hierarchy of control, which must include:

- Elimination
- Substitution
- Engineering control
- Administrative control
- Use of personal protective equipment

Stakeholders

Advising stakeholders, which may include:

- Occupier
- Employer
- Client

Range of Application

Ranges, contexts or circumstances under which competent performance may be demonstrated. It gives further references to specific areas or terms in the Performance Statements and Underpinning Knowledge

- Contractors
- Workers

Advise the stakeholders on implementation of noise and vibration control process

Advise the stakeholders on implementation of noise and vibration control process , which may include:

- Identification and ranking of noise sources
- Determination the priority of control starting with the source with highest noise
- Establishment of noise control design criteria
- Determination the noise reduction or insertion loss required
- Selection of control options
- Fabrication, installation and implementation of the control measures
- Monitoring and evaluation of the effectiveness of control measures

Phases of control

Advise stakeholders at different phases of control, which may include:

- Design or planning stage, which may include:
 - Noise specifications
 - Plant design
 - Machinery layout
- Operation stage, which may include:
 - Control at source
 - Control at path
 - Control at receiver

Effectiveness of noise and vibration control measures

Methods to evaluate effectiveness of noise and vibration control measures, which may include:

- Comparison of noise against occupational exposure limits
- Reduction in the source strength
- Reduction form the interruption of noise or vibration path, with barriers (for noise) or isolators (for vibration)
- Absorption of the noise or vibration energy (foam noise absorbers, or tuned vibration dampers)

Occupational Noise and Vibration Exposure Limits

Identify and apply Occupational Noise and Vibration Exposure Limits, which may include:

- Types of Occupational Noise Exposure Limits, which may include:
 - Permissible Exposure Limit (Singapore)
 - Threshold Limit Value (USA)
 - Workplace Exposure Limit (UK)
 - Occupational Exposure Standards (Australia)
- Types of Occupational Vibration Exposure Limits, which may include:
 - Hand-Arm (Segmental) Vibration

Range of Application

Ranges, contexts or circumstances under which competent performance may be demonstrated. It gives further references to specific areas or terms in the Performance Statements and Underpinning Knowledge

- Whole-Body Vibration

4.3 Learning Strategies and Delivery Methods

Curriculum developers are recommended to adopt the following structure for thinking about and planning a learning strategy:

- Summarise the learning strategy
- In this learning strategy, what learning principles are being applied?
- What learning theories or learning design theories underpin this strategy?
- How will this strategy resolve the identified learning problems? What is it about the learning strategy that will cause people to change in a way that resolves the learning problem?
- How would you describe the experience that learners will go through? How will this experience support their learning?
- What methods or tactics are most likely to be used to support this strategy?
- How will interface and media support this strategy?
- How will this strategy engage learners' interests?
- How will this strategy assess learners' progress or increased competence?

(Extracted from www.networked-learning.com, accessed 19 Sep 2010)

An example of instructional strategy selection for cognitive, affective and psychomotor domains is given in **Annex A**.

A non-exhaustive list of recommended delivery methods is provided below.

Delivery strategies	Applications
Presentation	This can be applied almost throughout this unit to introduce basic concepts and theory for the underpinning knowledge such as acoustic properties of noise, legal requirements. It can also be used to show photographs, videos and graphics as an effective mean of explaining concepts and describing items such as various types of noise control methods.
Discussion	Learners can be asked to discuss topics such as : <ul style="list-style-type: none">• Interpretation of applicable legal requirements• Challenges faced in characterising noise sources• Challenges faced in prioritising control measures and ways to overcome them• Pros and cons of various control methods

Delivery strategies	Applications
Demonstration	<p>This will be useful in showing the learners:</p> <ul style="list-style-type: none"> • The methods of calibrating an equipment, such as a noise meter • The setup of measuring equipment • The steps involved in characterise noise sources • Factors that can affect reading, such as by introducing a noise disturbance and demonstrating how the meter respond and the counter actions necessary <p>Note that it is very important to consider logistical arrangement and safety and health aspects of a demonstration to address all these concerns before such strategy is to be used.</p>
Practice	<p>Learners may be asked to practice on:</p> <ul style="list-style-type: none"> • Calculation dosage, addition / subtraction of noise. • Calibration, set up and use of measuring equipment
Observation and Feedback	<ul style="list-style-type: none"> • One group of learners or the adult educator may demonstrate the setup equipment and conduct a noise measurement while the other learners observe and give feedback thereafter • Learners may be asked to make observation at their workplace on how noise control measures are implemented, safe work procedures are being executed person protective equipment being enforced and provide feedback after that
Written Exercise	<p>Learners may be asked to:</p> <ul style="list-style-type: none"> • Sketch a schematics of control measure to a given machine • Draw a flow diagram of a noise control process • Respond to question with written answers or perform calculations of concentration, flow rates etc. • Fill up the blanks in a diagram or short paragraph with the missing information
Case Study	<p>Get the learners to work in groups. Issue them with a case study featuring health hazards at the workplace. Get them to determine the methods that will be most effective for the measurement of the health hazards and explain why the method(s) were chosen.</p>
Workplace Delivery / Practices	<p>Learners may be asked to:</p> <p>Conduct an analysis of a noise source at their workplace, or a simulated workplace, propose control measures stating rationale and submit a noise control report</p>

Where relevant and appropriate, the learning activities for the unit should be designed to shape or cultivate the expected attitudes of the candidates and to prepare them for their role in the sector.

Industry Requirements

The following learning method is mandated by the industry on for this competency unit:
Control Noise and Vibration.

- Practice on the design computation of noise reduction from barriers, enclosure, partition, silencers, room absorption and vibration absorption

MOM/ WSH Council officers shall conduct audits with or without notice on WSQ WSH TPs

4.4 Recommended Class Size and Facilitator-Learner Ratio

The recommended class size: 10 – 20. The maximum class size is 20.

For practical session, the group should not be more than 5.

CHAPTER 5: KEY ASSESSMENT ADVICE

This chapter describes the following components:

5.1 Assessment Strategies

A non-exhaustive list of assessment strategies and methods indicating the possible assessment methods or combination of assessment methods, as illustrated in below, can be used as a planning guide for determining the appropriate assessment strategy for the respective performance statements and underpinning knowledge in each Specialist Diploma in Occupational Hygiene competency unit.

Individual / Group Project report
Interview/ Oral Questioning
Written Assessment
Case Study
Practical Performance

In this Competency Unit: **Control Noise and Vibration**, the following assessment methods are suggested:

<u>Assessment Methods</u>	<u>Application</u>	<u>Evidence Sources</u>
<u>Demonstration</u>	The competent candidate must demonstrate, in a simulated environment, how to identify the noise and vibration hazard source, review existing control methods and past generated data, applied viable measuring methods, generate data, and implement substantial recommendations. The demonstration should include the selection of equipment used for inspection, measurement and the operation of that equipment in accordance to standards or measurement for noise and vibration hazards.	<u>Process Evidence</u> <ul style="list-style-type: none">• Noise control report• Recommendations of noise and vibration control measures• Records of maintenance of occupational noise and vibration control programmes• Records of maintenance and usage of measuring equipment• Types of noise and vibration control materials
<u>Written Report</u>	The competent candidate must submit a written report on the following essentials:	<u>Process Evidence</u>

<u>Assessment Methods</u>	<u>Application</u>	<u>Evidence Sources</u>
	observations, data compilation, reference to relevant legal and other requirements and standards, evaluation of effectiveness of existing control methods, and possible alleviating recommendations.	<ul style="list-style-type: none"> • Using noise and vibration measuring equipment, including inspection and calibration • Comparing and analyse frequency spectra • Selecting the appropriate noise and vibration control • Using appropriate noise and vibration labels • Calculating attenuation or noise reduction effectiveness
<u>Oral / Written Questioning</u>	<p>Learners may be asked questions relating to the content of written report for clarification of content, confirmation of competency, verification of knowledge and checking of report authenticity. Learn can also be asked on the underpinning knowledge covered in the unit, for instance, on <i>Objectives of noise control, workplace noise and vibration-related legal and other requirements, determine the characteristics of the noise and vibration hazard sources, measuring acoustic properties, Noise and vibration sources</i>, etc.</p> <p>Written questions may be given at the end of facilitated training for each hazard or end of a training day to check knowledge learnt in that contact period. Written questions can also be given as at the end of course as summative assessment. The answers to each written questions should be short, not exceeding 5 lines.</p>	<u>Knowledge Evidence</u> <ul style="list-style-type: none"> • Explain the fundamentals concepts in occupational noise and vibration control • Differentiate types and categories of occupational noise and vibration exposure limits and their respective meanings • Differentiate between types of control methods according to effectiveness • Name the types of equipment and methods for measurement of noise hazards

- The number of attempts a candidate is allowed to be assessed in the written assessment is ONE. The candidate certified "NOT YET COMPETENT" after the assessment must be re-coursed.

Industry Requirement

To facilitate uploading of the assessment results, TPs shall install the Automated Marking System (AMS) and its associated hardware.

The TP personnel who is authorised to use the AMS must also ensure that the assessment results are updated in SSG's TPGateway.

TPs are to upload the test results to MOM/ WSH Council no later than 5 calendar days after completion of the courses. All errors must be rectified within 24 hours for re-submission of the affected results to MOM/ WSH Council via WSH TRS. This is in addition to the uploading of assessment results to SSG via TPGateway.

5.2 Assessment Instruments and Tools

Assessments instruments and tools will be required to conduct the assessment planned. Examples of such templates include:

- An Evidence Sources Checklist to serve as a reporting snapshot of the types of evidence gathering that may be used. **(see Annex C)**
- A Performance Statement Criteria Checklist to record the performance statement been assessed **(see Annex D)**
- An Evidence Plan Checklist to list the down the expected evidence to be collected vis-à-vis sources of evidence. **(see Annex E)**
- Verbal/Written Assessment Checklists as an instrument for the recording of answers to questions concerning the performance statements and underpinning knowledge. **(see Annex F)**
- A Recording and Reporting Assessment Table Format as an instrument for the concise recording of competency and re-assessment information concerning the Competency Unit. **(see Annex G)**

5.3 Recommended Assessor to Candidate Ratio

- This section states the ratio of assessor to candidate. This ratio is dependent on the complexity of job performance, safety requirements and experience of the Assessor.
- The recommended assessor-candidate ratio for the various assessment strategies are shown as follows:

Quiz	1 to 20
Formative skill assessment	1 to 5
Written test	1 to 20
Summative oral questioning	1 to 1

CHAPTER 6: EQUIPMENT, FACILITIES AND WSH REQUIREMENTS

6.1 Equipment and Facilities Requirements

For this unit, the following equipment may be required:

- Sound level meters (Type I & II)
- Personal sound exposure meters
- Sound calibrators
- Octave and fractional octave filters (Type I)
- Vibration meters
- Acoustic materials
- Noise source (eg a vacuum machine, pre-recorded noise)
- Hearing protectors

The unit does not require specific facilities. If demonstration using equipment and samples of hazardous substance is used, considerations must be given to ensure that safety and health measures such as proper ventilation, lighting, containment for spill, clear route of exit, emergency response kit etc are implemented.

6.2 Workplace Safety and Health Requirements for Training Delivery and Assessment

Although training and assessment should be done in a manner that is as realistic as possible, due consideration shall be given to ensure the Occupational safety and health of the learners, trainers, assessors and all persons involved such as actors in the role play etc. Training and assessment centres should set a policy that commit to safety and health. Following are some measures that should be adopted whenever applicable:

- Ensure that environment and equipment used for training and assessment are safe prior to training or assessment sessions.
- Assess the risks of training and assessment activities, especially simulation, demonstration and role play, and take reasonably practicable measure to eliminate or minimise risks.
- Establish and implement relevant safety and health procedures, including action to be taken in case of emergency.
- Provide and ensure personal protective equipment is worn by the trainers, assessors and learners.
- Assign and communicate on the measures to be taken to minimise safety and health risks; and the safety and health responsibilities and accountabilities to trainers, assessor, learner and other persons involved on
- Maintain safety and health records, such as report of hazards, dangerous occurrence, near-miss, incident and accident.

Participants should only be required to undertake instruction and assessments in environments that comply with WSH regulations of Singapore.

Some suggested strategies that could apply to this training programme are:

- establish policies for safety and health
- establish roles and responsibilities with respect to safety and health
- specify procedures for safety and health
- communicate safety and health instructions to trainers, assessors, participants and administrative staff

There should be an emphasis on the interaction between everyone involved in the learning process. Mutual consultation should cover all aspects of the learning process. Trainers and assessors should make the participants aware of the WSH issues throughout the Competency Units in theoretical and practical situations. For more information on WSH regulations of Singapore please access <http://www.mom.gov.sg> and <http://wshc.gov.sg>

6.3 Total WSH Presentation Slides

- Total WSH presentation slides will be issued upon approval of the Training Provider.
- The materials are provided strictly for the explicit use and guidance of training providers for the conduct of this course.
- Any other use of the materials or parts thereof, reproduction, publication, distribution, transmission, re-transmission, or storage in a retrieval system in any form, electronic or otherwise, for purposes other than that expressly stated above without the express permission of WSH Council is strictly prohibited.

6.4 Training Provider Requirements

- Training Providers are required to fulfil the following requirements:
 - ISO 29993 certification;
 - bizSAFE Level 3 certification;
 - Blended learning
- Have developed an SOP to conduct online training and assessment (with online proctoring for supervisor and above courses) when required to do so.
- For each WSH course, the Training Provider must have at least:
 - a. 1 full time Principal/Director;
 - b. 1 full time WSH Approved Adult Educator/ Trainer/Facilitators for each WSH course; and
 - c. 2 approved full time/associate Adult Educator/ Trainer/Facilitators for each of the language.
- Training Providers are to inform the WSH Council when they withdraw their training provider status for any WSH course(s); or have their status suspended or terminated by any authority.
- Training Providers are to comply with the instruction by either (I) SkillsFuture Singapore (SSG), Ministry of Manpower (MOM) or the WSH Council to stop conducting any WSH Course(s) when an investigation is ongoing; or a non-

compliance is being verified. Further actions would be taken when fraudulent acts or significant non-compliances are established.

6.5 Training Venue Requirements

- 6.5.1 Unless prior approval has been granted by the CB, which had certified its WSH courses, each TP shall maintain and conduct its WSH course at its primary Training Venue. In addition, the TP shall ensure that the following are not shared with any other TP:
 - (a) their approved Training Venue/s; and
 - (b) Any other equipment or loads, which are used for the conduct of the WSH course.
- 6.5.2 In the event, where the TP wishes to conduct its WSH theory course(s) at a venue, other than the approved Training Venue, the TP must inform the CB, which had certified its WSH course(s) at the approved Training Venue/s, of its intent to effect such a change, and it must also demonstrate to the CB that:
 - (a) It has an approved Training Venue at the registered address;
 - (b) That the proposed venue is conducive for learning; and
 - (c) That there are no safety and health concerns in relation to the proposed venue/s.

The TP may conduct its WSH theory course(s) at a venue other than the approved Training Venue/s only after obtaining the CB's approval.
- 6.5.3 The requirement stated at Para 5.2 shall apply to a TP for single and multiple usage.
- 6.5.4 Where the CB has granted approval to the TP to conduct the WSH theory course(s) at an alternate venue, the TP must ensure that:
 - a) All training and assessment records are kept by the TP, for courses conducted, at the alternate venue. Such records shall include the following documents:
 - i. Photographs of the alternate venue;
 - ii. Photographs of the WSH theory course(s) being conducted at the alternate venue;
 - iii. Layout plan of the alternate venue; and
 - iv. Leasing documents;
 - b) The records mentioned in sub-paragraph 5.4(a) above, are continually updated;
 - c) The alternate venue is only used for the conduct of WSH theory course(s). No practical training/assessment shall be allowed at the alternate venue, unless approval has been granted by the Authorities; and
 - d) The alternate venue is not occupied and or used by another TP or WSH approved training provider at any time.

- 6.5.5 The TP must ensure that all Training Venues (including alternate venues) have been approved by the Urban Redevelopment Authority (URA) or the Housing & Development Board (“HDB”), either as a Commercial School (theory based only) or for Industrial Training (theory and practical), before it applies to be certified by the CB.
Note: Tenancy agreement (e.g. from JTC Corporation or other Developers) does not constitute a URA approval. Only correspondence with letterheads bearing the office of the relevant government authorities granting the approval shall be recognised.
- 6.5.6 Paragraph 6.5.5 shall not apply to TP who is applying for a once –off use of the theory training premises.
- 6.5.7 The TP is to note that a CB’s approval of any practical training venue is conditioned upon its safe and adequacy of the training facilities and equipment. The TP shall comply with all relevant legislations including but not limited to legislations involving land use, building, fire and safety.

6.6 Issuance of Certificate

6.6.1 A Statement of Attainment (SOA) will be issued by SSG (only for courses conducted in English) for candidates who have been assessed as “Competent”.

6.6.2 TPs are to issue safety passes in accordance to the format shown in Annex to every candidate who is assessed “Competent” in this Competency Unit. Issue of Certificate of Course Completion is Optional.

6.6.3 TPs are to issue the certificate of successful completion in accordance to the format shown in Annex to every candidate who is assessed “Competent” in this Competency Unit. Issue of Certificate of Course Completion is Optional.

CHAPTER 7: ADULT EDUCATOR REQUIREMENTS

This chapter articulates the Adult Educator (AE) requirements, on trainer / facilitator, developer, and assessor.

7.1 Trainer/ Facilitator Requirements

This section articulates the AE requirements covering these components:

Domain Knowledge Requirements

The trainer must have a Degree or post graduate degree in Occupational Health / Industrial Hygiene such as MSc (Safety Health and Environmental Technology) or in related disciplines such as Engineering or Physics. Those qualified as a Certified Industrial Hygienist (CIH)/ Certified Occupational Hygienist (COH) or have attained equivalent certifications will have an added advantage. Those who have successfully undertaken the Noise Monitoring Course or Industrial Noise Control Course by MOM approved training providers or the competency units on Monitor Noise and Vibration or Control Noise and Vibration under this framework will also have an added advantage.

Domain Work Experience

The trainer must have at least 5 years' WSH experience in Occupational Hygiene or Workplace Health. Experience as an Approved WSH Officer, Noise Monitoring Officer, Noise Control Officer, Radiation Safety Officer, Biosafety Coordinator is an added advantage. The trainer must also be able to provide evidence of maintaining currency, for example, through recent work in the industry as WSH occupational hygienist, manager, consultant or trainer, or professional development or active membership of a professional association in the relevant mentioned disciplines.

WSQ Trainer's Pedagogic Requirements

The trainer must have at least 2 years of training experience in a workplace health related programme over the last 4 years. The trainer must have been certified competent and awarded the Advanced Certificate in Training and Assessment (ACTA) or Advanced Certificate in Learning and Performance (ACLP) or Diploma in Adult Continuing Education (DACE) or Diploma in Design and Development of Learning for Performance (DDDLP).

All trainers/adult educators are required to attain 10 hours (minimum) annually by attending Continuing Professional and Development (CPD) courses conducted by appointed training providers. For more details, refer to Train-the-Trainer (T³) Programme in WSH Council website (www.wshc.sg)

The trainer for the course is not permitted to be the assessor for the same course learners during the assessment.

7.2 Developer Requirements

This section articulates the AE requirements covering these components:

Domain Knowledge Requirements

The developer must have a Degree or post graduate degree in Occupational Health / Industrial Hygiene such as MSc (Safety Health and Environmental Technology) or in related disciplines such as Engineering or Physics. Those qualified as a Certified Industrial Hygienist (CIH)/ Certified Occupational Hygienist (COH) or have attained equivalent certifications will have an added advantage. Those who have successfully undertaken the Noise Monitoring Course or Industrial Noise Control Course by MOM approved training providers or the competency units on Monitor Noise and Vibration or Control Noise and Vibration under this framework will also have an added advantage.

Domain Work Experience

The developer must have at least 5 years' WSH experience in Occupational Hygiene or Workplace Health. Experience as an Approved WSH Officer, Noise Monitoring Officer, Noise Control Officer, is an added advantage. The developer must also be able to provide evidence of maintaining currency, for example, through recent work in the industry as WSH occupational hygienist, manager, consultant or trainer, or professional development or active membership of a professional association in the relevant mentioned disciplines.

WSQ Developer's Pedagogic Requirements

The developer must have at least 2 years of training experience in a workplace health related programme over the last 4 years. The developer must also have been certified competent and awarded the Advanced Certificate in Training and Assessment (ACTA) or its equivalent. It is also preferred that the developer has been awarded the Diploma in Adult and Continuing Education (DACE), ie.

- With effect from 1 October 2015, a Diploma in Adult Continuing Education (DACE) or Diploma in Design and Development of Learning for Performance (DDDLP) is required.

7.3 Assessor Requirements

This section articulates the AE requirements covering these components:

Domain Knowledge Requirements

The assessor must have a Degree or post graduate degree in Occupational Health / Industrial Hygiene such as MSc (Safety Health and Environmental Technology) or in related disciplines such as Engineering or Physics. Those qualified as a Certified Industrial Hygienist (CIH)/ Certified Occupational Hygienist (COH) or have attained equivalent certifications will have an added advantage. Those who have successfully undertaken the Noise Monitoring Course or Industrial Noise Control Course by MOM approved training providers or the competency units on Monitor Noise and Vibration or Control Noise and Vibration under this framework will also have an added advantage.

Domain Work Experience

The assessor must have at least 5 years' WSH experience in Occupational Hygiene or Workplace Health. Experience as an Approved WSH Officer, Noise Monitoring Officer and Noise Control Officer is an added advantage. The assessor must also be able to provide evidence of maintaining currency, for example, through recent work in the industry as WSH occupational hygienist, manager, consultant or trainer, or professional development or active membership of a professional association in the relevant mentioned disciplines.

WSQ Assessor's Pedagogic Requirements

The assessor must have at least 2 years of training experience in a workplace health related programme over the last 4 years. The assessor must have been certified competent and awarded the Advanced Certificate in Training and Assessment (ACTA) or Advanced Certificate in Learning and Performance (ACLP) or Diploma in Adult Continuing Education (DACE) or Diploma in Design and Development of Learning for Performance (DDDLP).

CHAPTER 8: SUMMARY OF MANDATORY SECTIONS / INFORMATION

This chapter summarizes all the mandatory sections and required information, for easy reference. TPs / Adult Educators are expected to note the information indicated in the following Sections and to comply with the stated requirements, where appropriate:

<u>Section</u>	<u>Title</u>
3.3	Recommended Learning Hours (RLH)
4.1	Content Coverage on Percentage of Items under Range of Application and Evidence Sources
4.3	Learning Strategies and Delivery Methods-Industry Requirements
4.4	Recommended Class Size and Trainer-Trainee Ratio
5.1	Assessment Strategies - Industry Requirements
5.3	Recommended Assessor to Candidate Ratio
7.1	Trainer Requirements
7.2	Developer Requirements
7.3	Assessor Requirements

CHAPTER 9: RESOURCE INFORMATION

This chapter indicates the various literatures, journals, articles and researched information on the competency unit 'Control Noise and Vibration' and within the domain of Occupational Hygiene. The Harvard Referencing Guide is adopted. An illustration is given below:

References:

Plog , Barbara A , 2001. Fundamentals of Industrial Hygiene. 5th ed. USA: National Safety Council.

Industrial Noise Control: Fundamentals & Applications by Lewis H. Bell and Douglas H. Bell, 2nd edition 1994, Marcel Dekker. ISBN 0-8247-9028-6

Guidelines for Noise Control and Vibration by Ministry of Manpower, 2003

Guideline on Boundary Noise Limit for Centralised Air conditioning and ventilation systems in Non-Industrial Buildings by National Environment Agency

OHTA Approved Training Materials:

Red Magma. 2010. W503 Noise- Measurement and its Effects. [ONLINE] Available at: <http://www.ohlearning.com/training/training-materials/w503-noise--measurement-and-its-effects.aspx>. [Accessed 16 May 11].

PART III

Glossary of Terms

This section presents the list of terms and abbreviations used in this document as well as terms frequently encountered in the training and assessment.

Assumed Attitudes, Skill and Knowledge: Attitudes, skills and knowledge that the individual should preferably have to confidently undertake the unit and to be successful subsequently on the job

Competency Category: The broad area or function in which competency are mainly found. This information is use to provide additional contextual information on the background of the competency standard.

Competency Unit: Describes a particular work role, duty or function, which forms the smallest group of skills, knowledge and abilities that are to be recognised separately for certification.

Credit Value: A value assigned to the competency unit by SSG based upon the WSQ Credit System.

CTAG: Known as Curriculum Training and Assessment Guide (CTAG) is prepared by the Skills Future Singapore (SSG) to aid Training Providers (TPs) in the design and delivery of competency-based training programme for the respective competency units

Directed learning: The trainer/assessor-directed and purposefully instructed to trainees to complete as part of instructional design of a structured training & assessment programme.

Evidence Sources: Types of proof (product, process and knowledge evidences) and individual may produce to demonstrate competent performance.

National Accreditation Recognition (NAR): IOHA National Accreditation Recognition scheme. A system for ensuring comparability of professional levels of Occupational Hygiene qualifications

Occupational Hygiene: The practice of anticipation, recognition, evaluation and control of workplace health hazards and risks to prevent ill health and protect the wellbeing of persons at work. Such health hazards may include chemical, physical and biological; and those related to human factors. It is also commonly known as “Industrial Hygiene”.

Performance Statements: The critical aspects of job performance, stating the evaluative criterion and expected outcome of tasks

Range of Application: Ranges, contexts or circumstances under which competent performance may be demonstrated. It gives further references to specific areas or terms in the Performance Statements and Underpinning Knowledge.

Recommended Learning Hour (RLH): The total hours of competency-based

training and assessment, taking into account the time required for directed learning activities. The RLH includes examples as follows:

- Facilitated training and assessment
- E-learning and assessment
- Structured On-Job-Training (OJT)
- Practicum or Project Work if any

Underpinning Knowledge: Knowledge that is acquired during the course of training and is essential to support competent performance. It may include principles, processes, methods, procedures, legislative / legal requirements.

List of Acronyms

ACTA	Advanced Certificate in Training and Assessment
ABIH	American Board of Industrial Hygiene
BOHS	British Occupational Hygiene Society
CB	Certification Body
CIH	Certified Industrial Hygienist
CS	Competency Standard
CPE	Certified Professional Ergonomist
CTAG	Curriculum, Training and Assessment Guide
GSDD	Generic Skills Development Division, SSG
MOM	Ministry of Manpower
NEA	National Environment Agency
NAR	National Accreditation and Recognition
OH	Occupational Hygiene
IOHA	International Occupational Hygiene Association
OHTA	Occupational Hygiene Training Association
PPE	Personal protective equipment
PS	Performance Statement
RLH	Recommended Learning Hours
SDOH	Specialist Diploma in Occupational Hygiene
TP	Training Provider
UK	Underpinning Knowledge
WDA	Singapore Workforce Development Agency
WH	Workplace Health
WPLN	Workplace Literacy and Numeracy
WSH	Workplace Safety and Health
WSQ	Singapore Workforce Skills Qualifications

Glossary

CB	A Certification Body (CB) is an organization accredited by the Singapore Accreditation Council (SAC) to assess and certify a WSH Training Provider's compliance to ISO 29993:2017 and MOM/WSH Council requirements.
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Version Control Record

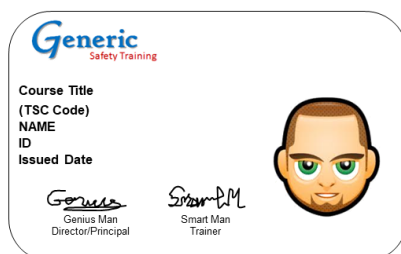
Version	Effective Date	Status / Changes
1.0	1 Aug 2011	-
1.1	1 June 2012	Changes to AE requirements
2.0	21 Jan 2022	Update
3.0	1 September 2023	Update

Format of Safety Pass

Guidelines for the credit card size pass for MOM WSH courses by TPs

3 $\frac{3}{8}$ × 2 $\frac{1}{8}$ inch (85.60 × 53.98 mm)

Front view



Font Type: Arial
Font size (Course title): Recommended 8pt or larger
Font size (Others): Recommended 6pt or larger
Photo size: 3.1cm X 2.4cm

- Pass should contain no less than the information depicted in the guide
- TP may use their own reference format for serial number
- Course Title should be the title as indicated in the WSQ Framework (CS/CTAG). The Technical Skills and Competency (TSC) Code and Title, should also be printed in parentheses () aligned to the title reflected in either the Competency Standards (CS) or TSC. However, it is not required to print the TSC Course name if it is the same as the SC/CTAG title
- ID should be FIN, NRIC Passport Number or any unique official identifier
- Course Venue should reflect address of training centre (not business office, etc) which pass holder attended
- Trainer signature should reflect the trainer that conducted the course

Back view

1. Use of card is governed by terms and conditions of < Name of Training Provider>
2. < Name of Training Providers> is a SkillsFuture Singapore Agency's Training Provider at the date of issuance of the pass
3. This card is not transferrable
4. The course is conducted @ < Course venue>
5. Holder of the card has been certified competent in the <Course Title> on the issued date as indicated in front.
6. This card will expire <xx> years from the date of issue.
7. This card is the property of < Name of Training Provider> and must be returned on request.
8. Card shall be retained if it has been tampered with, misused or replaced.
9. This card is issued by < Name of Training Provider>. If found, please return to < Name of Training Provider>. at <Address of < Name of Training Provider>..
10. For enquiries, please contact < Name of Training Provider>. > at <hotline>

Font Type: Arial
Font size : Recommended 6pt or larger

Certificate of Successful Completion

3 inch 10pt 20pt 10pt 15pt 12pt 10pt 15pt 10pt 12pt 10pt 10pt 1 inch

<Official Logo/Name of TP>

Serial Number: <xxx>

CERTIFICATE OF SUCCESSFUL COMPLETION

Font type: Arial
Font size: Recommended as stipulated
Header/Footer space: Recommended as stipulated

is awarded to

<Name of Trainee>

< ID >

for successful completion of the
<Course Title>

<TSC Title/Code>

< Name of TP >

<TP approved by SkillsFuture Singapore>

@ < Training venue>

from

<Training Date/s>

Validity: < x Years from last date of course/ NA>



Genius Man
Director / Principal
Training Division
<Name of TP> /
Company Stamp

Smart Man
Trainer
Training Division
<Name of TP>

<Name of TP> | UEN: <XXX> | <Office Address>
Tel: <xxx> | Fax: <xxx> | Website: <xxx> | Email: <xxx>

- Certificate should contain no less than the information depicted in the guide
- TP may use their own reference format for serial number
- ID should be FIN, NRIC Passport Number or any unique official identifier
- For TP Course, Course Title should be the corresponding title as indicated in WSQ System Framework(CS/CTAG). The Technical Skills and Competency (TSC) Code and Title should be printed in parentheses () aligned to the title reflected in either the Competency Standards (CS) or TSC. However, it is not required to print the TSC course name if it is the same as the CS/CTAG Title
- Course Venue should reflect address of training centre (not business office, etc) which pass holder attended
- Certificate should indicate that <<Name of TP>> is a Training Provider (TP) approved by SkillsFuture Singapore for <<Course Title of corresponding course>>
- Trainer signature should reflect the trainer that conducted the course
- Management of safety certificate should be in accordance to the requirements under TP scheme

Annex A

Instructional Strategy Selection Chart

Instructional Strategy	Cognitive Domain (Bloom, 1956)	Affective Domain (Krathwohl, Bloom, & Masia, 1973)	Psychomotor Domain (Simpson, 1972)
Lecture, reading, audio/visual, demonstration, or guided observations, question and answer period	1. Knowledge	1. Receiving phenomena	1. Perception 2. Set
Discussions, multimedia CBT, Socratic didactic method, reflection. Activities such as surveys, role playing, case studies, fishbowls, etc.	2. Comprehension 3. Application	2. Responding to phenomena	3. Guided response 4. Mechanism
On-the-Job-Training (OJT), practice by doing (some direction or coaching is required), simulated job settings (to include CBT simulations)	4. Analysis	3. Valuing	5. Complex response
Use in real situations. Also may be trained by using several high level activities coupled with OJT.	5. Synthesis	4. Organize values into priorities	6. Adaptation
Normally developed on own (informal learning) through self-study or learning through mistakes, but mentoring and coaching can speed the process.	6. Evaluation	5. Internalizing values	7. Origination

The chart does not cover all possibilities, but most activities should fit in. For example, self-study could fall under reading, audio visual, and/or activities, depending upon the type of program you design.

(extracted from <http://www.nwlink.com/~donclark/hrd/strategy.html>, accessed 19 Sep 2010)

Annex B: Occupational Hygiene Professionals Competency Map and Qualifications Framework

<div>Key Purpose:</div> <div>To drive improvements in workplace health (WH) management and raise WH standards through quality professional development of competent and motivated Occupational Hygiene (OH) Professionals to assist employers, occupiers and other stakeholders in the anticipation, recognition, evaluation and control of occupational hygiene risks at the workplace</div>					
<div>Entry Requirements</div> <div>Literacy, Numeracy and Science Requirements</div> <div><div><div>- ES WPLN Level 6, or</div><div>- Grade C6 in GCE 'O' Level for English and Mathematics and</div><div>- Grade C6 in GCE 'O' Level Science (Chemistry and Physics)</div></div></div> <div>Assumed Attitude, Skills and Knowledge (ASK)</div> <div>Working Experience</div> <div>Recommended to have at least 2 years of working experience in any industry</div> <div>Attitudes</div> <div>Self-directed, with an analytical mind and a meticulous approach to problem-solving. Passionate and committed to ethical practice in Occupational Hygiene. Receptive to change in the light of new evidence.</div> <div>Key Industries</div> <div>Chemical, Process, Pharmaceutical, Manufacturing, Healthcare, Marine, Construction, Education and Research & Development</div>	<div>Competency Category</div> <div>Physical Hazards</div> <div>Include hazards arising from heat, cold, radiation, noise and vibration at the workplace. These hazards can cause varying forms of strain and injury to the body.</div>	<div>Core Units</div> <div><div>- Interpret Basic Workplace Health Practices (OH-GE-501C-1)</div><div>- Monitor Noise and Vibration (OH-PH-501C-1)</div><div>- Control Noise and Vibration (OH-PH-502C-1)</div></div>	<div>Elective Units</div> <div>Elective Units (Group 1)</div> <div><div>- Assess and Control Thermal Stressors (OH-PH-503E-1)</div><div>- Manage Radioactive Materials and Irradiating Apparatus (OH-PH-504E-1)</div><div>- Control Hazards in Handling Laser Devices (OH-PH-505E-1)</div></div>	<div>Qualification:</div> <div>Specialist Diploma in Occupational Hygiene</div> <div>Requirements:</div> <div>8 Core Units + 2 Electives Units from Group 1 + 1 Elective Unit from Group 2</div> <div>Occupational Title</div> <div>OH Officer</div> <div>Recommended Learning Hours (RLH)</div> <div>Total: 308-344 hours</div>	
	<div>Chemical Hazards and Biological Hazards</div> <div>Include hazards arising from exposure to chemical substances that may be hazardous to health of persons at work if inhaled, swallowed, or absorbed through the skin. These chemical substances may be present in the workplaces in solid, liquid or gaseous states.</div> <div>Also include hazards arising from exposure to substances of biological origin at the workplace. The sources of these hazards include bacteria, viruses, insects, plants, birds, animals, and humans, and their products which may present a potential risk to the health and well-being of humans.</div>		<div><div>- Measure Exposure and Assess the Risks due to Hazardous Substances (OH-CB-501C-1)</div><div>- Evaluate Health Effects due to Hazardous Substances (OH-CB-502C-1)</div><div>- Manage Hazardous Substances (OH-CB-503C-1)</div></div>		<div><div>- Manage Asbestos and Other Fibres Risks (OH-CB-504E-1)</div><div>- Manage Skin Exposure Risks (OH-CB-505E-1)</div><div>- Assess Confined Space for Safe Entry and Work (OH-CB-506E-1)</div><div>- Manage Indoor Air Quality (OH-CB-507E-1)</div><div>- Evaluate and Control Biological Hazards (OH-CB-508E-1)</div></div>
	<div>Human Factors</div> <div>Include hazards arising from human-machine interface, job design, psychological and psychosocial variables at the workplace. These can cause injury to the worker's musculoskeletal system and also lead to psychophysical stress.</div>		<div><div>- Evaluate Ergonomics-Related Hazards (OH-HF-501C-1)</div></div>		
	<div>Non-Technical Skills</div> <div>These skills will enable learners to generate feasible, efficient and innovative solutions to solve work problems, enhance productivity and capitalise on new opportunities, as well as to work and communicate effectively in a diverse team environment and negotiate for mutually beneficial outcomes.</div>	<div><div>- Compose Technical Report (OH-NT-501C-1)</div></div>	<div>Elective Units (Group 2)</div> <div><div>- Lead Workplace Communication and Engagement (ES-IP-401G-1)</div><div>- Solve Problem and Make Decision at Managerial Level (ES-ACE-402G-1)</div><div>- Apply Systems Thinking in Problem Solving and Decision Making (ES-ACE-501G-1)</div><div>- Plan, Prepare for and Deliver Presentations (WP-IC-505E-1)</div></div>		

Map Summary

Core Units: 8
Elective Units: 12
Total Units:

Legend



Core Units



Elective Units (Group 1)



Elective Units (Group 2)

Imported Units

Ver 1.1 (updated June 2012)

Occupational Roles/Competent Persons Regulated by MOM/NEAⁱ

Competency Units	RLH	Credit Value	Courses Accredited by MOM/NEA		Occupational Roles/ Competent Persons
			Unit Title	Duration (hours)	
Core Units					
Interpret Basic Workplace Health Practices	40	4	-	-	-
Monitor Noise and Vibration	24	2	Noise Monitoring Course	24	Noise Monitoring Officer
Control Noise and Vibration	16	2	Industrial Noise Control Course	20	Noise Control Officer
Measure Exposure and Assess the Risks due to Hazardous Substances	40	4	Sampling & Monitoring of Airborne Contaminant	24	Competent persons for sampling and monitoring of airborne contaminants
Evaluate Health Effects due to Hazardous Substances	40	4	-	-	-
Manage Hazardous Substances	40	4	Management of Hazardous Substances	28	HS licensee
Evaluate Ergonomics-Related Hazards	40	4	-	-	-
Compose Technical Report	8	1	-	-	-
Elective Units – Group 1					
Assess and Control Thermal Stressors	40	4	-	-	-
Manage Radioactive Materials and Irradiating Apparatus	30	3	Basic Ionising Radiation Safety (General) Course	16	L5/L6 (non-NDT work) licensee
Control Hazards in Handling Laser Devices	20	2	Basic Laser Radiation Safety Course	16	N3 licensee
Manage Asbestos and Other Fibres Risks	40	4	Asbestos Removal and Management	16	-
Manage Skin Exposure Risks	40	4	-	-	-
Assess Confined Space for Safe Entry and Work	40	4	Confined Space Safety Assessor Course	39	Confined Space Safety Assessor
Manage Indoor Air Quality	28	3	Management of Indoor Air Quality	20	-
Evaluate and Control Biological Hazards	24	2	-	-	-
Elective Units – Group 2					
Lead Workplace Communication and Engagement	16	2	-	-	-
Solve Problem and Make Decision at Managerial Level	16	2	-	-	-
Apply Systems Thinking in Problem Solving and Decision Making	16	2	-	-	-
Plan, Prepare for and Deliver Presentations	16	2	-	-	-

The OH Professionals WSQ Framework is largely referenced to the mandatory courses for competent persons accredited by Ministry of Manpower (MOM) and National Environment Agency (NEA)

RLH: Recommended Learning Hours: This refers to the total hours of competency-based training and assessment, taking into account the time required for directed learning activities

Annex C

Evidence Sources Checklist

Name of Candidate and Organisation	
Name of Assessor	
Date & Venue of Assessment	

[illegible]

Annex D

Performance Statement Checklist

Name of Candidate and Organisation	
Name of Assessor	
Date & Venue of Assessment	
Competency Unit(s)	

Assessment Strategy		Performance Statement Assessed	Result		Remarks
			C	NYC	
1.	Work Observation				
2.	Written / Oral Test				
3.	Written / Verbal/ Management reports				
4.	Presentation				
5.	Others				

Annex E

Evidence Plan Checklist

Evidence Plan		
Name of candidate & Organisation		
Name of assessor		
Competency Unit(s)		
Sources of Evidence	Expected Evidence	Received
Research Project		<input type="checkbox"/>
Work Observation		<input type="checkbox"/>
Written Activities /		<input type="checkbox"/>
Personal Statement/Resume		<input type="checkbox"/>
Workplace Documents (verified)		<input type="checkbox"/>
Training Records		<input type="checkbox"/>
Case Studies		<input type="checkbox"/>
Projects		<input type="checkbox"/>
Journal/Diary		<input type="checkbox"/>
Testimonials		<input type="checkbox"/>
Skills development activities		
Arrangements		
Agreement		
<input type="checkbox"/> Evidence to be submitted by:		
<input type="checkbox"/> Interview date:		
<input type="checkbox"/> I agree to the evidence plan:		
<input type="checkbox"/> Candidate	_____ (name)	_____ (signature)
<input type="checkbox"/> Assessor	_____ (name)	_____ (signature)

Annex F

Verbal/Written Assessment Checklist

Record of Interview Questions			
Name of Candidate & Organisation			
Name of assessor			
Date and Venue of Assessment			
Competency Unit(s)			
Questions		Satisfactory Response Yes No	Remarks
Q1.		<input type="checkbox"/> <input type="checkbox"/>	
Q2.		<input type="checkbox"/> <input type="checkbox"/>	
Q3.		<input type="checkbox"/> <input type="checkbox"/>	
Q4.		<input type="checkbox"/> <input type="checkbox"/>	
Q5.		<input type="checkbox"/> <input type="checkbox"/>	
Q6.		<input type="checkbox"/> <input type="checkbox"/>	
Q7.		<input type="checkbox"/> <input type="checkbox"/>	
Q8.		<input type="checkbox"/> <input type="checkbox"/>	
Q9.		<input type="checkbox"/> <input type="checkbox"/>	
Q10.		<input type="checkbox"/> <input type="checkbox"/>	
The candidate's underpinning knowledge and understanding was: Satisfactory <input type="checkbox"/> Not satisfactory <input type="checkbox"/>			
Signed by the candidate: _____ Date: _____			
Signed by the assessor: _____ Date: _____			
Feedback to candidate:			

Annex G

Suggested Format for Recording and Reporting Assessment

Competency Unit(s)	
Name of Candidate & Organisation	
Name of assessor	
Date and Venue of Assessment	

Assessment Criteria For...	Competent	Not Yet Competent
{Performance Statement 1}		
{Performance Statement 2}		
{Performance Statement 3}		
{Underpinning knowledge 1}		
{Underpinning knowledge 2}		
Feedback to participant:		
Assessor's Signature : _____ Date: _____		

Re-assessment information

Date of re-assessment _____	Competent	Not Yet Competent
Item/s to be re-assessed		
Assessor's Signature : _____ Date: _____		