

COURSE OVERVIEW HE1941
Industrial Hygiene Certification Program
BOHS-M505: Control of Hazardous Substances
(Accredited by the British Occupational Hygiene Society - BOHS)

Course Title

Industrial Hygiene Certification Program:
 BOHS-M505: Control of Hazardous Substances
(Accredited by the British Occupational Hygiene Society - BOHS)



Course Date/Venue

December 15-19, 2024/TBA Meeting Room,
 The H Hotel, Sheikh Zayed Road, Dubai, UAE

Course Reference

HE1941

Course Duration

Five days/3.7 CEUs/37 PDHs



Course Description



This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course aims to provide candidates with an understanding of how exposure to hazardous substances arises and where they may occur, in the workplace and introduce methods and technologies which are available to control exposures and help reduce risks to health.



On completing this course successfully, participants will be able to:-

- Describe how airborne contaminants are generated by industrial processes, how this would impact on the control strategy, and how control solutions can be optimised
- Recognise the range of approaches to risk reduction embodied in the hierarchy of control and select appropriate strategies for implementation
- Describe the meaning of “adequate control” in relation to personal exposures
- Discuss the importance of design considerations in terms of the workplace, process, and plant, as a means of reducing occupational exposures



- Describe the principal elements of a local exhaust ventilation system, give examples of typical installations, and know how to conduct the necessary measurements to assess whether a local exhaust ventilation system is effective and operating to the design specification
- Recognise the limitations of local exhaust hoods and enclosures and the means to optimise their effectiveness
- Describe how personal protective equipment programmes may be used in an effective manner
- Recognise the impact that control measures may have on other workplace hazards and understand the need to take a holistic approach to the design of control solutions

This course is designed to provide participants with a detailed and up-to-date overview of BOHS-M505: Control of Hazardous Substances. It covers the range of properties of airborne contaminants and the potential hazards they may present; develop an understanding of the approach to controlling exposure problems and how to select appropriate control strategies; the workplace control principles covering hierarchy of control, achieving effective control and the role of assessment (by all routes); the practical applications of the hierarchy of control and identifying effective control strategies, adopting the principles of reasonable practicability.

During this interactive course, participants will learn the design of equipment and workplace and apply prevention, elimination and substitution; the general ventilation systems and local exhaust ventilation (LEV) and apply proper measurement and testing of LEV systems; the personal protective equipment, respiratory protective equipment, chemical protective clothing (CPC), gloves and dermal care; and the various administrative elements.

The course will require at least 45 hours of study time, of which at least 37 hours will be taught (teaching and practical assessments) and 8 hours will be independent (in the candidates' own time).

Candidates for this course are expected to be aware of the general contents of the Control of Substances to Health (COSHH) regulations, HSE Guidance Note HSG193 COSHH Essentials Easy Steps to Control Chemicals, HSE Guidance Note HSG258 controlling Airborne Contaminants at Work and HSE Guidance Note HSG53 Respiratory Protection at Work.

Course Objectives

Upon the successful completion of this course, each participant will be able to:

- Achieve the BOHS Certificate in BOHS-M505: Control of Hazardous Substances
- Consider the range of properties of airborne contaminants and the potential hazards they may present
- Develop an understanding of the approach to controlling exposure problems and how to select appropriate control strategies
- Discuss the workplace control principles covering hierarchy of control, achieving effective control and the role of assessment (by all routes)

- Carryout practical applications of the hierarchy of control and identify effective control strategies, adopting the principles of reasonable practicability
- Describe the design of equipment and workplace and apply prevention, elimination and substitution
- Recognize general ventilation systems and local exhaust ventilation (LEV) and apply proper measurement and testing of LEV systems
- Use personal protective equipment, respiratory protective equipment, chemical protective clothing (CPC), gloves and dermal care as well as identify the various administrative elements

Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials, sample video clips of the instructor’s actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.

Who Should Attend

This course provides an overview of all significant aspects and considerations of control of hazardous substances for technicians and technologists who conduct measurements and testing in workplaces.

Exam Eligibility & Structure

There are no prerequisites required for this qualification.

Suggested References and Further Reading

- (1) WHO Guidelines on the prevention of toxic exposures
- (2) ACGIH Industrial Ventilation A Manual of Recommended Practice
- (3) ACGIH Guidelines on Selection of Chemical Protective Clothing
- (4) Controlling airborne contaminants at work HSE books HSG258
- (5) Respiratory Protection at Work HSE Books HSG53
- (6) ISO 16900 series standards on Respiratory Protective Devices
- (7) ISO 16602 Protective Clothing for Protection against Chemicals – Classification, labelling and performance requirements
- (8) NIOSH guide to industrial respiratory protection
- (9) NIOSH A guide for assessing the performance of protective clothing
- (10) Controlling Skin Exposure to Chemicals and Wet-Work

Training Fee

US\$ 7,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Exam Fee

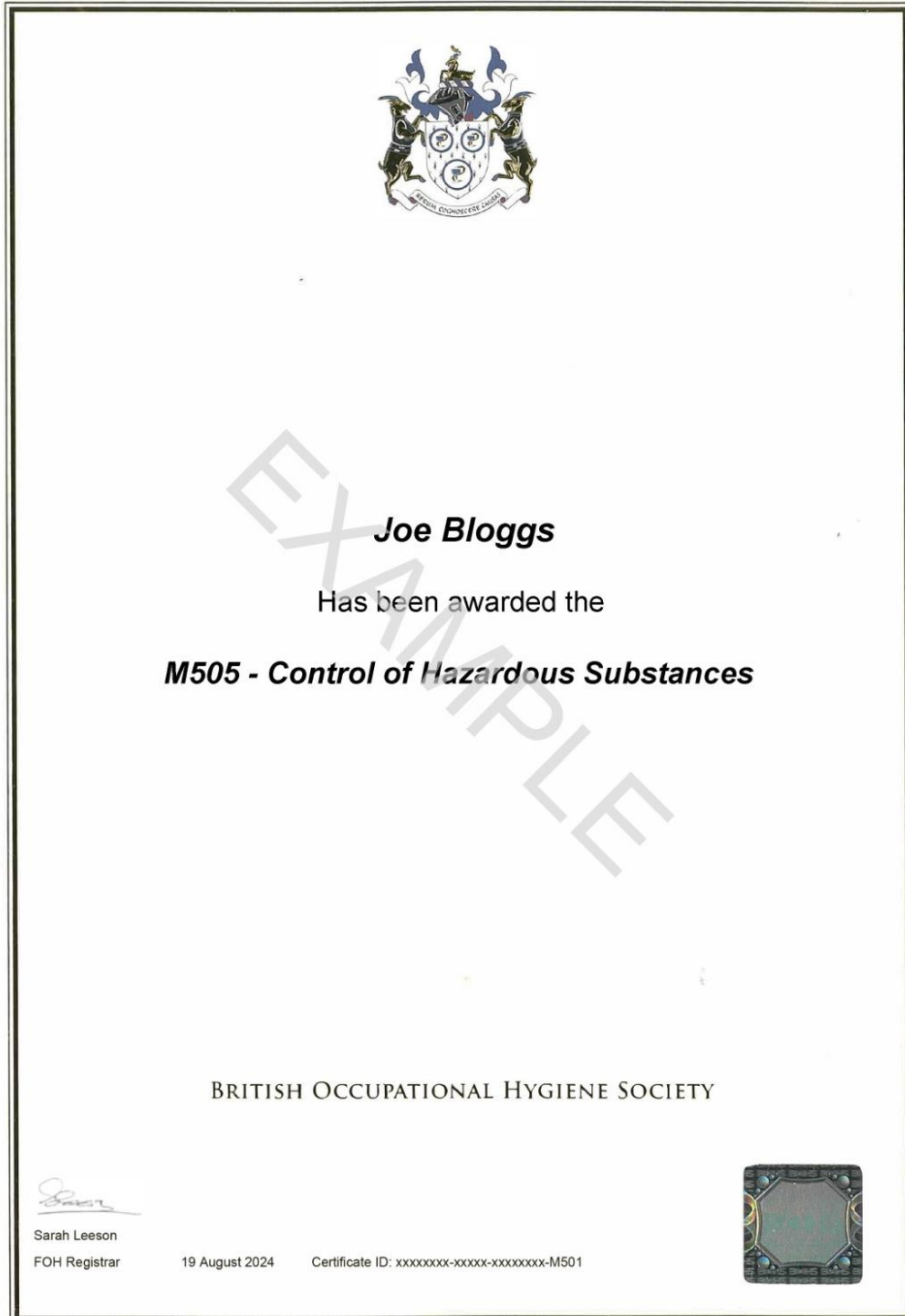
US\$ 175 per Delegate + **VAT**

Course Certificate(s)

(1) BOHS-M505 – Control of Hazardous Substances will be awarded to participants who have successfully completed the course and passed all the parts (A and B) within 12 months.

BOHS Certificate(s)

The following certificate is a sample of the BOHS certificates that will be issued to successful candidates:-





- (2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course.

* Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology *

Haward Technology Middle East

Continuing Professional Development (HTME-CPD)

CEUs

CEU Official Transcript of Records

TOR Issuance Date: 15-Nov-23

HTME No. 74851

Participant Name: Waleed Al Habeeb

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
HE1941	Industrial Hygiene Certification Program BOHS-M505: Control of Hazardous Substances <i>(Accredited by the British Occupational Hygiene Society - BOHS)</i>	November 11-15, 2023	37	3.7

Total No. of CEU's Earned as of TOR Issuance Date **3.7**

TRUE COPY

Jaryl Castillo
Academic Director

Haward Technology has been approved as an Accredited Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this approval, Haward Technology has demonstrated that it complies with the ANSI/IACET 1-2018 Standard which is widely recognized as the standard of good practice internationally. As a result of their Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for programs that qualify under the ANSI/IACET 1-2018 Standard.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking Continuing Education Units (CEUs) in accordance with the rules & regulations of the International Association for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology is accredited by


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Certificate Accreditations

Haward Technology is accredited by the following international accreditation organizations:-

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The British Occupational Hygiene Society (BOHS)

Haward Technology is an Approved Training Partner of the British Occupational Hygiene Society (BOHS) for the M201 and M500 series modules, which are designed to maintain a high standard of occupational hygiene education.

Together with BOHS, Haward Technology supports hygiene professionals in their mission to create safe working environments globally and is committed to advancing the practice of occupational hygiene to promote healthier workplaces worldwide.


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The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units (CEUs)** in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.7 CEUs** (Continuing Education Units) or **37 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Peter Jacobs, is a **Senior HSE Consultant** with almost **25 years** of extensive experience within **Oil & Gas, Refinery** and **Petrochemical** industries. His wide experience covers in the areas of **OHTA Modules** (Measurement of Hazardous Substances, Thermal Environment, Noise Measurement & Its Effects, Asbestos & Other Fibers, Control of Hazardous Substances, Ergonomics Essentials, Health Effects of Hazardous Substances), Advanced **Industrial Hygiene, Incident Command & Report Writing, HAZOP, HAZMAT, HAZID, Health Risk**

Assessment, Modern Safety Risk Management, Process Risk Management, Root Cause Analysis Techniques, **HSE Management System** Development & Implementation, **SAESI Hazardous Materials** for the **First Responder Operations (NFPA 472)**, **Industrial Safety & Housekeeping, Job Safety & Hazard Analysis, Hazardous Substances** Measurement, **Workplace** Control, Physical Agents, **Emergency Response, Chemical & Biological** Operations, Basic **Safety & Loss Prevention**, Safety in **Chemical Laboratory, Confined Space Safety, Industrial Hygiene, Occupational Health & Hygiene, Ergonomics, Biological** Assessment, **Radiation** with Radon/Thoron Assessment, **Radiation** Protection Safety, **Radiation** Monitoring, Natural **Radiation** Sources, **Nuclear** Regulatory Act, **Industrial Ventilation, Air Pollution Dispersion** Modelling, Basic Clandestine **Drug Laboratory** Investigation, **Chemical** Engineering, **Fire Safety & Evacuation, Evacuation** Safety, Safety Orientation, Hand & Power Tools Safety, Isokinetic Stack Sampling, Dust Exposure, Quantifying Workplace Stressors, Noise & Airborne Pollutants, Thermal Stress, Illumination, Mine Health & Safety, Statistical Method Validation, Legal Audit Compliance, Riot & Crowd Control, ISO 14000, OHSAS 18000, ISO 17025 and ISO 9000.

During his career life, Mr. Jacobs has gained his practical and field experiences through his various significant positions and dedication as the **Forensic Science Laboratory Manager, Occupational Hygienist, Radiation Protection Officer, Lead Practitioner, Safety, Health & Environmental (SHE) Specialist, First Responder, OHS Inspector, Ambulance Assistant** and **LPG Distributor Auditor** from various international companies like the Sedulitas, Richards Bay Minerals, Sasol and South African Police Service.

Mr. Jacobs has a **Master's** degree in **Public Health – Occupational Hygiene**, a **National Diploma in Purchasing Management** and an **Intermediate Certificate in Mine Environmental Control** an **Accredited South African Emergency Services Institute (SAESI)**. Further, he is a **Certified Instructor/Trainer**, an Appointed Commissioned Officer, a SAIOH/ IOHA President, an Assessor/Moderator of Health & Welfare SETA, a **Registered Occupational Hygienist** of the Southern African Institute for Occupational Hygiene, awarded as a SAIOH **Occupational Hygienist** of the Year Award and a well-regarded member of the British Occupational Hygiene Society (**BOHS**), Mine Ventilation Society of South Africa (MVSSA) and South African Radiological Protection Association (SARPA). He has further delivered numerous trainings, courses, seminars, workshops and conferences worldwide.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: Sunday, 15th of December 2024

0730 – 0745	Registration & Coffee
0745 – 0800	Welcome & Introduction
0800 – 0815	PRE-TEST
0815 – 0930	Hazardous Substances Uses & Processes <i>Consider the Range of Properties of Airborne Contaminants (Dusts – Aerosols – Vapours – Gases) & the Potential Hazards They May Present</i>
0930 – 0945	Break
0945 - 1130	Hazardous Substances Uses & Processes (cont'd) <i>Using a Series of Short Case Studies, Provide an Overview of the Health Hazards & Risks & the Sources & Factors Affecting Emission of Airborne Contaminants, in Order to Develop an Understanding of the Approach to Controlling Exposure Problems & How to Select Appropriate Control Strategies. These should Include such Processes as in the Use of Rotary Tools (e.g. Circular Saws, Rotary Sanders) Other Directional Processes (e.g. Paint Spraying) & Fume Yielding Processes (e.g. Welding & Soldering)</i>
1130 - 1230	Hazardous Substances Uses & Processes (cont'd) <i>Using a Series of Short Case Studies, Provide an Overview of the Health Hazards & Risks & the Sources & Factors Affecting Emission of Airborne Contaminants, in Order to Develop an Understanding of the Approach to Controlling Exposure Problems & How to Select Appropriate Control Strategies. These should Include such Processes as in the Use of Rotary Tools (e.g. Circular Saws, Rotary Sanders) Other Directional Processes (e.g. Paint Spraying) & Fume Yielding Processes (e.g. Welding & Soldering) (cont'd)</i>
1230 – 1330	Lunch

1330 - 1415	Hazardous Substances Uses & Processes (cont'd) <i>The Principles of Containment & Control Techniques for Common Process such as Weighing & Dispensing Solids & Liquids from Containers to Process Equipment should be Considered for a Range of Materials from Low to High Hazard</i>
1415 - 1500	Workplace Control Principles: Hierarchy of Control <i>Principles of Identifying Hazards & Risks in the Workplace • Hierarchy of Control & Its Underlying Principles - Work Procedures, Process Engineering Control, Ventilation & PPE. (Practicable Programmes May Involve a Combination of Measures)</i>
1500 - 1515	Break
1515 - 1620	Workplace Control Principles: Achieving Effective Control <i>The Meaning of Adequate Control including the Use of Occupational Exposure Limits, Other Published & In-House Standards (Including those for Carcinogens, Asthmagens & Biological Agents)</i>
1620 - 1630	Recap <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise them of the Topics to be Discussed Tomorrow</i>
1630	End of Day One

Day 2: Monday, 16th of December 2024

0730 - 0930	Workplace Control Principles: The Role of Assessment (By All Routes) <i>Identify Exposures, Confirm Compliance & Achieve Adequate Control • Identify Risks at the Design Stage & in Existing Facilities to Identify Risks from Normal Operations & During Non-Routine or Maintenance Activities</i>
0930 - 0945	Break
0945 - 1030	Workplace Control Principles: The Practical Application of the Hierarchy of Control e.g. Use of a Combination of Measures, Stepwise Approach
1030 - 1115	Workplace Control Principles: Identifying Effective Control Strategies, Adopting the Principles of Reasonable Practicability (Including COSHH Essentials/ILO Toolbox)
1115 - 1230	Process Design & Principles: Design of Equipment & Workplace <i>General Design of Equipment & Workplace Layout & How This Influences Exposure</i>
1230 - 1330	Lunch
1330 - 1530	Process Design & Principles: Design of Equipment & Workplace (cont'd) <i>The Effects of Automation & Robotics</i>
1530 - 1545	Break
1545 - 1620	Process Design & Principles: Prevention, Elimination & Substitution <i>Prevention of Exposure by Good Process Design, including Containment, Elimination or Substitution of Hazardous Substances & Activities</i>
1620 - 1630	Recap <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise them of the Topics to be Discussed Tomorrow</i>
1630	End of Day Two

Day 3: Tuesday, 17th of December 2024

0730 – 0900	Process Design & Principles: Prevention, Elimination & Substitution (cont'd) Examples of Industrial Processes Where Hazards May be Minimised by Changes to Substance or Form (e.g. Reduction of Volatile Constituents, Granulation of Dusty Powders)
0900 - 0915	Break
0915 - 1130	Ventilation Systems: Types of System General Ventilation Systems, Local Exhaust Ventilation (LEV)
1130 - 1230	Ventilation Systems: Principles Basic Principles of System Design- Fans, Ducts, Air Cleaners & Discharges • Fan Types & their Typical Applications • Duct Sizing, Configuration & Duct Materials
1230 - 1330	Lunch
1330 - 1500	Ventilation Systems: Principles (cont'd) Principles of System Balancing • Facilities for Thorough Examination, Maintenance, Examination & Testing. • Air Cleaners -Types (Gravity & Centrifugal Col Lectors, Dry Fabric, Electrostatic, Wet Methods, Absorption Types) & Their Performance
1500 – 1515	Break
1515 - 1620	Ventilation Systems: General Ventilation Systems Use as a Means of Controlling Airborne Exposures • Principles of Natural Ventilation & Infiltration • Mechanical Ventilation, Dilution or Displacement including Methods of Delivery & Distribution
1620 – 1630	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow
1630	End of Day Three

Day 4: Wednesday, 18th of December 2024

0730 – 0930	Ventilation Systems: General Ventilation Systems (cont'd) Determination & Calculation of Ventilation Requirements • Application & Limitations of General Ventilation
0930 - 0945	Break
0945 – 1230	Ventilation Systems: Local Exhaust Ventilation (LEV) Design Features • Lev Hoods; Enclosing Hoods, Receiving Hoods & Capturing Hoods. • Capture Velocities, Face Velocity, Transport Velocities • Fletcher & Garrison Methods of Predicting Air Flows, Velocity Contours & Effects of Flanges • Application of Hoods of All Types & Use of Partial & Total Enclosures in Industrial Situations • Limitations of Lev • Supply Air, (Importance of Location & Direction) Use of Treated Recycled Air • Safe Discharge Arrangements. (Treatment Before Discharge & Location of Discharge)
1230 – 1330	Lunch
1330 – 1500	Ventilation Systems: Measurement & Testing of LEV Systems Measurement of Performance & Relation to Attainment of Control of Exposure • Calculations for Volume Flows from Pressure & Velocity Measurements
1500 – 1515	Break
1515 - 1600	Ventilation Systems: Measurement & Testing of LEV Systems (cont'd) Maintenance Examination & Test; Periodic Checks & Inspections Thorough Examinations & Testing • Continued Satisfactory Performance Indication

1600 - 1620	Personal Protective Equipment: General Types of Personal Protective Equipment (PPE) including Respiratory Protective Equipment (RPE) Protective Gloves & Chemical Protective Clothing • Limitations of Use • Definition of Suitability • Importance of Selection, Training, Maintenance & Proper Use in the Development of a PPE Programme
1620 - 1630	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow
1630	End of Day Three

Day 5: Thursday, 19th of December 2024

0730 - 0930	Personal Protective Equipment: Respiratory Protective Equipment Types of RPE & Their Limitations E.G. Dust Respirators; High Efficiency, Powered, Ventilated Visors, Disposables, Ori-Nasal, Breathing Apparatus
0930 - 0945	Break
0945 - 1100	Personal Protective Equipment: Respiratory Protective Equipment (cont'd) Respirators for Organic Vapours & Inorganic Gases. • Selection, Use & Maintenance of RPE. Face Fit Testing
1100 - 1230	Personal Protective Equipment: Chemical Protective Clothing (CPC) Types of CPC • Performance Criteria • Testing Effectiveness • Application, Limitations • Storage Arrangements, Laundering Arrangements, Role in Prevention of Spread of Contamination • Suitability for Use & Integrity
1230 - 1330	Lunch
1330 - 1415	Personal Protective Equipment: Gloves & Dermal Care Basic Dermal Exposure Assessment Techniques & Principles of Dermal Exposure Risk Management • Types of Gloves & Their Performance Data • Permeation & Breakthrough • Glove Selection, Maintenance & Training in Use
1415 - 1430	Break
1430 - 1545	Administrative Elements Reducing Periods of Exposure • Exclusion of Non-Essential Personnel, Personal Hygiene Arrangements • Co-Ordinated Approach to Control, Training, Supervision • Control of Access to Hazardous Areas • the Role of Assessment, Measurement, Monitoring & Health Surveillance in Initiating Control Measures • Role of Written Operating Procedures, Permits to Work Etc. • Role of Occupational Hygiene Programmes in Continuing Control
1545 - 1600	POST-TEST
1600 - 1615	Course Conclusion
1615 - 1630	Presentation of Course Certificates
1630	End of Course

MOCK Exam

Upon the completion of the course, participants have to sit for a MOCK Examination similar to the exam of the Certification Body through Haward's Portal. Each participant will be given a username and password to log in Haward's Portal for the MOCK exam during the 30 days following the course completion. Each participant has only one trial for the MOCK exam within this 30-day examination window. Hence, you have to prepare yourself very well before starting your MOCK exam as this exam is a simulation to the one of the Certification Body.

Examinations & Assessment

Candidates are required to pass all of the following parts (A and B below) to be awarded this qualification.

(A) Practical Assessment

The practical assessment will be conducted by the Tutor during relevant parts of the course for all candidates. This is to ensure that every candidate can demonstrate their individual ability and correct method.

The practical exercises will involve:

- Visualisation of air flows as a means to test control (smoke tubes, smoke generators and dust lamps) on at least two typical ventilation systems
- Measurements in relation to a selection of extract points (e.g. face velocity or capture velocity) using thermal and vane anemometers and show a basic understanding of requirements for a selection of tasks.

Full details of the practical requirements and individual candidate reporting can be found in the Practical Evaluation Report which is available from www.bohs.org

(B) Written Examination

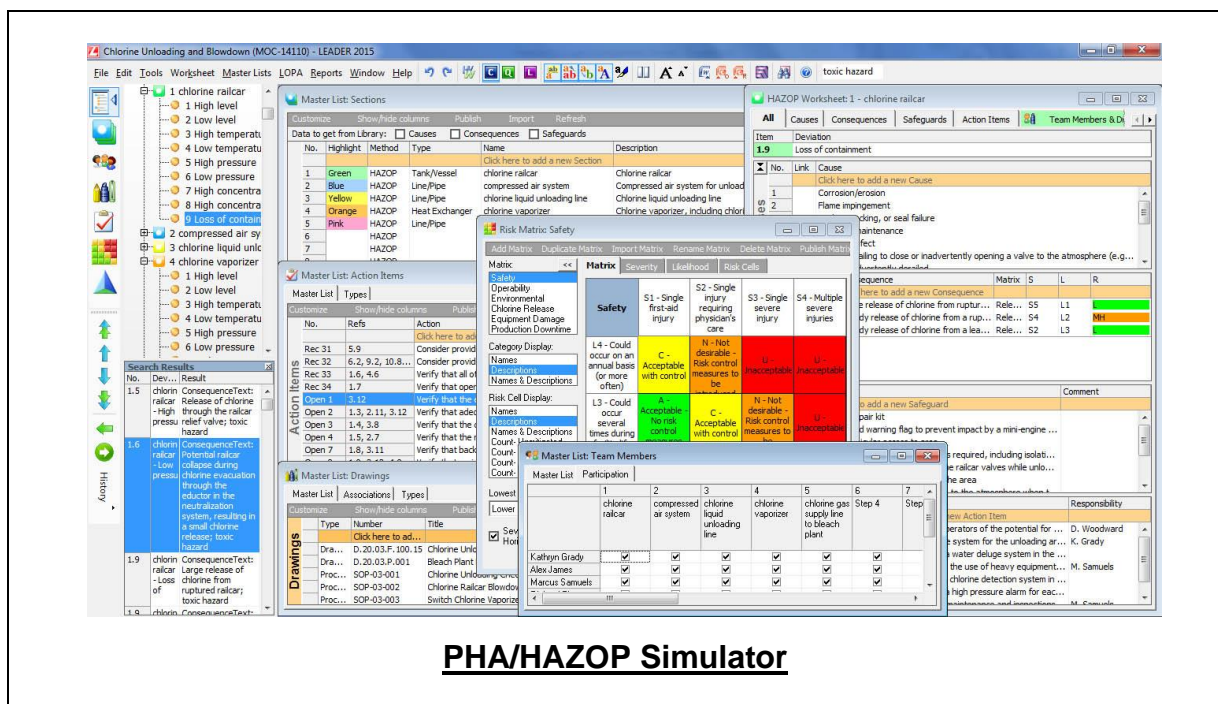
This is an open-book examination comprising of 40 (160 marks) short-answer questions illustrated by photographs and diagrams as appropriate to be answered in 2 hours. Each question is worth 4 marks

The examination covers all sections of the syllabus and is overseen by an invigilator.

The pass mark for this examination is 50 %

Simulator (Hands-on Practical Sessions)

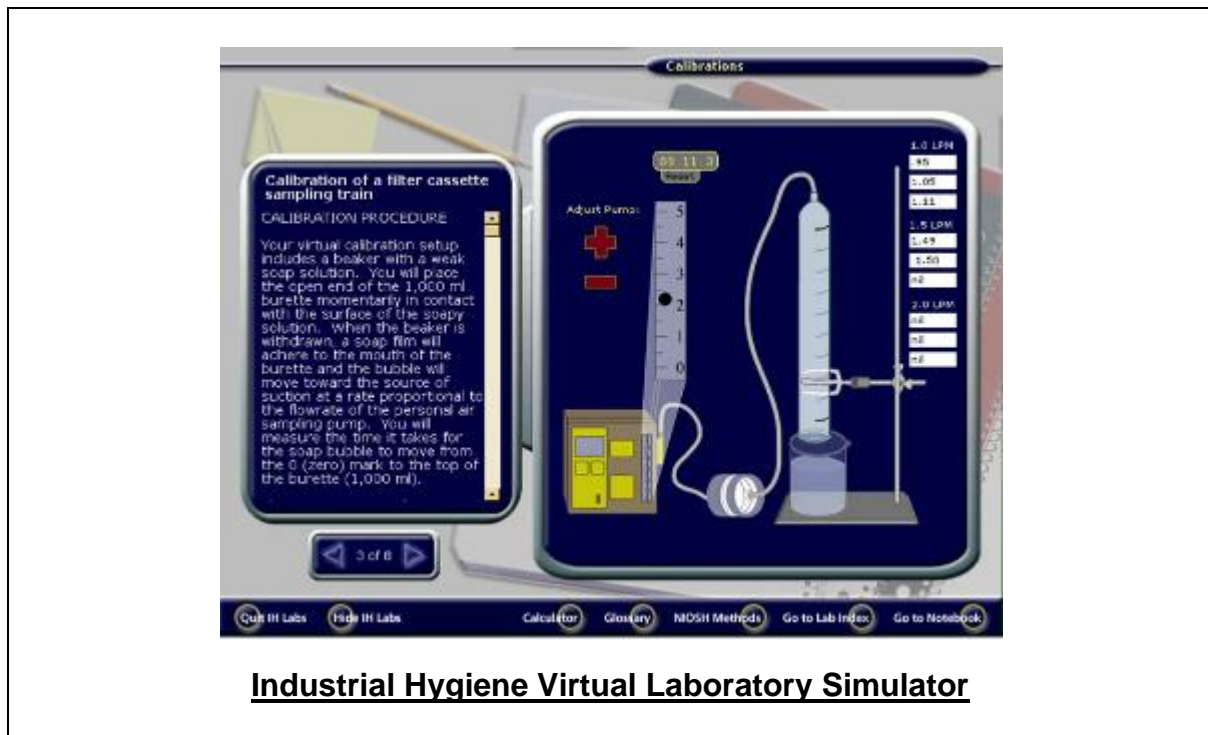
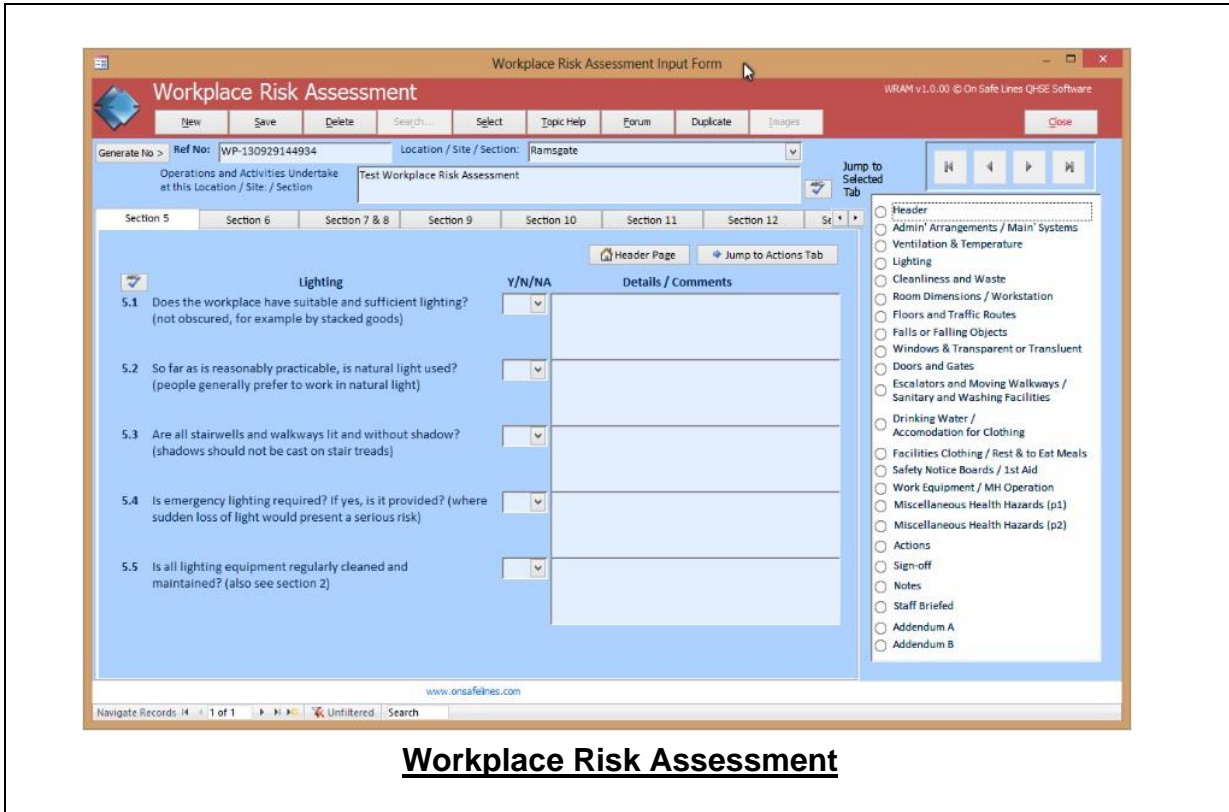
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art “PHA/HAZOP”, “Workplace Risk Assessment” “Industrial Hygiene Virtual Laboratory” and “CIHprep V9.0 ” simulators.

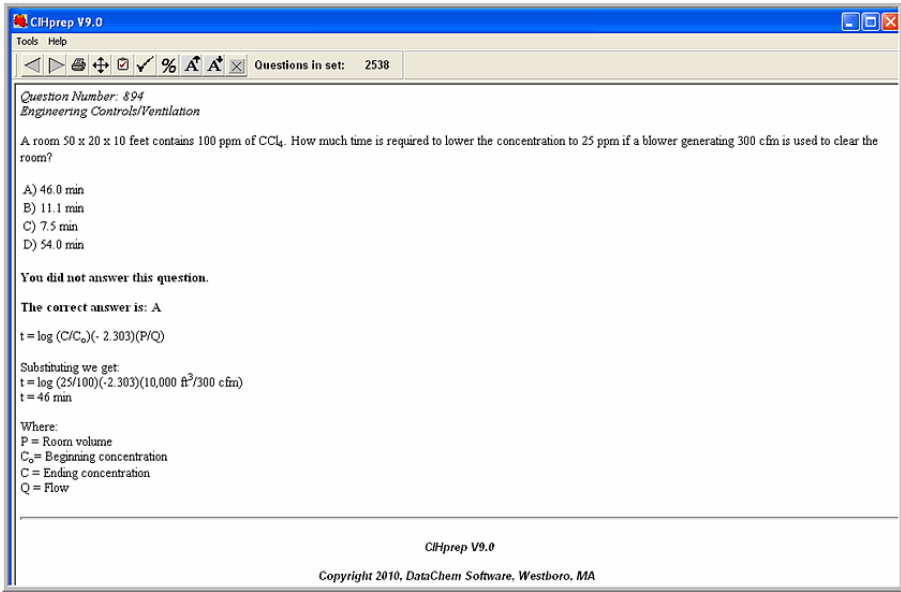


The screenshot displays the PHA/HAZOP Simulator software interface. It includes several panels:

- Master List: Sections:** A table listing sections with columns for No., Highlight, Method, Type, Name, and Description. Sections include Chlorine railcar, compressed air system, chlorine liquid unloading line, and chlorine vaporizer.
- Risk Matrix Safety:** A matrix table with columns for Safety, S1 (Single first-aid injury), S2 (Single injury requiring physician's care), S3 (Single severe injury), and S4 (Multiple severe injuries). Rows include L4 (Could occur on an annual basis), L3 (Could occur several times during), and L2 (Could occur once during).
- Master List: Action Items:** A table with columns for No., Refs, and Action. Actions include 'Consider providing relief valve', 'Verify that all of...', and 'Verify that oper...'
- Master List: Drawings:** A table with columns for No., Title, and Published. Drawings include 'Chlorine Unloading', 'Bleach Plant', 'Chlorine Railcar Blowdown', and 'Switch Chlorine Vaporizer'.
- HAZOP Worksheet:** A detailed worksheet for 'chlorine railcar' showing causes, consequences, safeguards, and action items.
- Team Members:** A table listing team members and their participation in various steps of the process.

PHA/HAZOP Simulator





CIHprep V9.0

Tools Help

Questions in set: 2538

Question Number: 894
Engineering Controls/Ventilation

A room 50 x 20 x 10 feet contains 100 ppm of CCl₄. How much time is required to lower the concentration to 25 ppm if a blower generating 300 cfm is used to clear the room?

A) 46.0 min
B) 11.1 min
C) 7.5 min
D) 54.0 min

You did not answer this question.

The correct answer is: A

$$t = \log(C/C_0) \cdot (-2.303) \cdot (P/Q)$$

Substituting we get:
 $t = \log(25/100) \cdot (-2.303) \cdot (10,000 \text{ ft}^3 / 300 \text{ cfm})$
 $t = 46 \text{ min}$

Where:
P = Room volume
C₀ = Beginning concentration
C = Ending concentration
Q = Flow

CIHprep V9.0
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CIHprep V9.0 Simulator

Course Coordinator

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