

Course Specification

课程规格

Course Title	Measurement of Hazardous Substances (Including Risk Assessment)			
课程标题	有害物质测量, (包括风险评估)			
Code	W501			
编号	W501			
Level	Foundation	Intermediate	☒ Advanced	☐
等级	基础	中级	☒ 高级	☐
Pre-requisites	None			
预备知识	无			

Course Material	Course manual available from OH learning.com
课程材料	OH learning.com所提供的课程手册
Coordinating Editor	Julie Panko
流程编辑	Julie Panko
Approval Date	June 2009
批准日期	2009年6月
Review Date	June 2012
审核日期	2012年6月

Aims

The course aims to:
Provide the student with a sound understanding of the techniques for assessing exposure to hazardous substances in the workplace and with an understanding of how exposure information can be used to assess risk.

目标

本课程旨在：
帮助学员充分了解作业场所危险物质接触评估的技术，了解何种接触信息可用于评估风险。

Learning Outcomes

On completing this course successfully the student will be able to:

- describe the general approach to health risk assessment, including the role of atmospheric monitoring;
- select appropriate equipment to measure specific airborne contaminants and devise a suitable sampling strategy;
- present the results in a form useful for health risk assessment purposes to enable management to comply with relevant legislation.

学习成果

成功完成本课程后，学员应具备如下能力：

- ☐ • 描述健康风险评估的常规方法，包括大气监测的作用；
- ☐ • 选择合适的设备测量特定的空气污染物，并制定合适的取样策略；
- 采用有利于健康风险评估格式公布结果，以确保管理符合有关法规规定。

Course Format

Normally run as a 5 day
taught course [minimum 45
hours including lectures, tutorials,
practical/demonstration sessions, guided reading,

课程形式

通常情况下，课程持续5天（至少45个小时，包括讲课，辅导，实践/示范课，指导阅读，课后问题和检查]。

overnight questions and examination].

There will be a 40 short answer question “open book” examination with an allowed time of 120 minutes.

将会要求学员回答40个简单的问题，实施开卷考试，考试时间为120分钟。

Content
内容

Topic 主题	Title 标题		Time Allocation 所占时间比例
1	Risk Assessment	风险评估	20%
2	Air Sampling Theory and	空气取样理论与实践	20%
3	Air Sampling Equipment	空气取样设备	20%
4	Sample Analysis	样本分析	5%
5	Hygiene Standards	卫生标准	15%
6	Biological Monitoring	生物监测	10%
7	Calculation, Interpretation and Presentation of Results	结果计算，解释和呈递	10%

Note: Reference is made to standards and good practice documentation. This may not be the most up-to-date relevant publications and is intended as guidance for candidates only.

注： 本文档为标准 and 良好实践文档的参考。非最新版，仅供读者参考。

1 Risk Assessment (20%)

1.1 Definitions

1.1.1 Hazard

- Define hazard in terms of chemical safety

1.1.2 Risk

- Define risk in terms of chemical safety

1.2 The Risk Assessment Process

1.2.1 Information gathering

- Be aware of the sources of information
- Be able to make judgements about the significance of a hazard from toxicological properties, physiochemical properties and other data

1.2.2 Assessing risk

- Understand the relationship between risk, hazard and exposure
- Be able to make judgements about likely risk based upon the possible health effects, physiochemical properties and use of a hazardous material
- Be able to make judgements about probable risk based upon measurement data

1.2.3 Actions

- Be able to use risk assessments to decide on appropriate actions to protect worker health

1.2.4 Records

- Be able to record risk assessment information in a useful form
- Understand why it is important to record risk assessment information

1.2.5 Management

- Understand the role of risk assessment in occupational health and safety management

2 Air Sampling Theory and Practice (20%)

2.1 Workplace Sampling Strategies

2.1.1 Strategies

1 风险评估 (20%)

1.1 定义

1.1.1 危害

- 从化学品安全性角度定义危害。

1.1.2 风险

- 从化学品安全性角度定义风险。

1.2 风险评估过程

1.2.1 信息收集

- ☐ • 了解信息来源
- ☐ • 能够通过毒理学性质, 理化性质等数据判断危害的重要性

1.2.2 风险评估

- 了解风险, 危害和接触之间的关系
- ☐ • 能够通过可能的健康影响, 理化性质和危险物质的使用, 对可能存在的风险进行判断。
- 能够通过测量数据判断可能的风险

1.2.3 措施

- ☐ • 能够使用风险评估来决定保护作业人员健康的适当措施。

1.2.4 记录

- ☐ • 能够采用有用格式记录风险评估信息
- ☐ • 了解记录风险评估信息的重要性

1.2.5 管理

- ☐ • 了解职业健康和安全管理中风险评估的作用

2 空气取样理论与实践 (20%)

2.1 作业场所取样策略

2.1.1 策略

	• Understand what a sampling strategy is and its importance in gaining representative results • Be aware of how the choice of a strategy may affect the measurement results	□ • 了解什么上取样策略，以及取样策略于获得具有代表性结果中的重要性。 □ • 了解策略的选择如何影响测量结果
2.1.2	Surveys • Understand the different types of surveys • Be aware of how the results from different types of surveys can be used	调查 □ • 了解不同类型的调查 □ • 了解如何使用不同类型调查的结果
2.1.3	Routine monitoring • Understand the role of routine monitoring • Be able to plan basic routine monitoring programmes	常规监测 □ • 了解常规监测中的作用 □ • 能够规划基本常规监测项目
2.1.4	Interpretation of results • Understand how monitoring strategy and survey type can effect results • Be able to make judgements about the significance of measurement results	结果解释 □ • 了解监测策略和测量类型如何影响结果 □ • 能够判断测量结果的重要性
2.1.5	Basic statistical analysis • Be aware of how basic statistical tools can be used to help with the interpretation of measurement results	基本统计分析 □ • 了解如何使用基本统计工具解释测量结果
2.1.6	Quality assurance • Understand the importance of quality assurance in surveys	质量保证 □ • 了解质量保证对调查的重要性
2.2	Survey Design	调查设计
2.2.1	Non-sampling approaches • Be able to apply non-sampling approaches such as the ILO Chemical Control Toolkit or COSHH Essentials • Understand the uses and limitations of such approaches	非取样方法 □ • 能够应用非取样方法，诸如研拟的健康危害物控制需知和国际劳工组织工具包 □ • 了解非取样方法的用途和局限性
2.2.2	Survey design • Understand the effects of survey design on measurement results • Be able to design basic surveys to produce representative measurements (what, who, where, when, etc)	调查设计 □ • 了解调查设计对测量结果的影响 □ • 能够设计基本调查，以获得具有代表性的测量（何事，何人，何地，何时，等等）
2.2.3	Sample numbers • Be able to calculate the appropriate number of samples required to produce representative	样本数量 □ • 能够计算出获得具有代表性测量结果所需的样本数量

	measurements		
	Understand the basis of statistically representative sampling		了解具有统计学代表意义取样的基础
2.2.4	Grab samples Understand use and limitations of grab sampling	2.2.4	随机样本 了解随机取样的用途和局限性
2.2.5	Acute and chronic effects Be able to design sampling strategies that are appropriate for different types of health effect	2.2.5	急性和慢性影响 能够设计适合于不同类型健康影响的取样策略
2.2.6	8 hour TWA and 15 minute STEL sampling - Understand the significance of TWA and STEL measurements - Be able to adjust measurements for different sampling periods - Be able to calculate TWA results from multiple measurements	2.2.6	8小时时间加权平均浓度和15分钟短时间接触容许浓度取样 - 了解时间加权平均浓度和短时间接触容许浓度测量的意义 - 能够调整不同取样周期的测量 - 能够根据多个测量结果计算时间加权平均浓度
2.3	<i>Personal Sampling</i>	2.3	<i>个人取样</i>
2.3.1	Breathing zone Understand the location of the breathing zone and its significance in personal sampling	2.3.1	呼吸区 了解呼吸区的位置，以及其于个人取样中的意义
2.3.2	Effect of sample head location Understand the effect of sample head location on the sample collected	2.3.2	样本头部位置的影响 了解样本头部位置对所采集样本的影响
2.3.3	Operator variability Understand the reasons for the differences in exposure measurement between operators	2.3.3	操作员的可变性 了解不同操作员之间接触测量结果存在差异的原因
2.4	<i>Area Sampling</i>	2.4	<i>区域取样</i>
2.4.1	General or background measurements Understand the function and limitations of background measurements	2.4.1	常规或背景测量 了解背景测量的功能和局限性
2.4.2	Contaminant spread Understand the effect of particle size and physiochemical properties on contaminant spread	2.4.2	污染物的扩散 了解颗粒大小和理化性质对污染物扩散的影响
2.4.3	Breathing air quality Be aware of the techniques for assessing the quality of breathing air supplied for use in air-fed respirators	2.4.3	呼吸气质量 了解评估用于供气呼吸器和自给式呼吸器中空气质量的方法

and self-contained
breathing apparatus

2.5 Surface and Other Measurements

2.5.1 Surface contamination measurements

- Be aware of the techniques and uses of surface contamination measurements

2.5.2 In-situ XRF metal analysis

- Be aware of the uses of in-situ XRF metal analysis

2.5.3 Settlement of contaminants

- Be aware of how settlement rates of particulates can affect their dispersion

2.5.4 Bulk sampling

- Understand the role of bulk sampling in determining the nature of a contaminant

2.5.5 Skin exposure

- Understand the techniques for assessing skin exposure

2.6 Confined Spaces

2.6.1 Identification and the nature of confined spaces hazards

- Be aware of where confined space hazards might exist
- Understand the nature of such hazards

2.6.2 Assessment techniques

- Be aware of the techniques for monitoring confined spaces

3 Air Sampling Equipment (20%)

3.1 Sampling Pumps

3.1.1 Common types of pump

- Be aware of the different types of sampling pump and their use

3.1.2 Fixed volume hand pumps for indicator tubes

- Understand the correct use of fixed volume hand pumps

3.1.3 Mechanism of operation

- Be aware of the basic operating systems for sampling pumps

3.1.4 Intrinsic safety of sampling equipment

- Be aware of the need for intrinsically safe sampling pumps in certain environments

3.2 Sampling Heads and Filters

2.5 表面和其他测量

2.5.1 表面污染物的测量

- • 了解表面污染物测量的技术和用途

2.5.2 原位X射线荧光光谱金属分析

- • 了解原位X射线荧光金属分析的用途

2.5.3 污染物的沉降

- • 了解颗粒的沉降速率对其扩散的影响

2.5.4 大量取样

- • 了解大量取样对确定污染物性质的作用

2.5.5 皮肤接触

- • 了解评估皮肤接触的方法

2.6 密闭空间

2.6.1 密闭空间危害的性质和识别

- • 了解密闭空间危害可能存在的位置
- • 了解危害的性质

2.6.2 评估方法

- • 了解监测密闭空间的方法

3 空气取样设备(20%)

3.1 取样泵

3.1.1 常见类型的取样泵

- • 了解不同类型的取样泵及其用途

3.1.2 指示管用固定容积手动泵

- • 了解固定体积手动泵的正确使用

3.1.3 操作机制

- • 了解取样泵的基本操作系统

3.1.4 取样设备的本质安全性

- • 了解本质安全型取样泵在某些环境中的需求

3.2 取样头和过滤器

3.2.1	Particulates • Understand the techniques for sampling of common particulates • Understand the use of size fractionation techniques for respirable dusts	3.2.1	颗粒 ☐ • 了解常见颗粒取样的技术 ☐ • 了解适用于可吸入粉尘的大小分级技术的使用
3.2.2	Sampling heads • Be aware of the different types of sampling heads and their uses • Understand the effect of the filter head on the sample collected	3.2.2	取样头 ☐ • 了解不同类型的取样头及其用途 ☐ • 了解过滤器头对采集样本的影响
3.2.3	Filters • Be aware of the different types of filters • Understand the use of filters for trapping particulates • Be aware of the use of chemically treated filters for sampling for reactive materials	3.2.3	过滤器 ☐ • 了解不同类型的过滤器 ☐ • 了解用于捕获微粒的过滤器的使用 ☐ • 了解用于反应材料取样的化学处理过滤器的使用
3.2.4	Gases and vapours • Understand the use of whole air sampling • Understand the use of solvation for trapping gases and vapours • Understand the use of chemical derivatisation for sampling for reactive materials • Understand the use of adsorption	3.2.4	气体和蒸汽 ☐ • 了解全空气取样的用途 ☐ • 了解捕获气体和蒸汽的溶剂化的用途 ☐ • 了解活性材料取样用化学衍生物的用途 ☐ • 了解吸收的用途
3.2.5	Types of adsorbent and absorbent • Understand the basic principles of adsorption • Understand the difference between adsorbents and absorbents • Be aware of the common types of adsorbents and their uses	3.2.5	吸附剂和吸收剂的类型 ☐ • 了解吸附的基本原理 ☐ • 了解吸附剂和吸收剂之间的区别 ☐ • 了解吸附剂的常见类型及其用途
3.2.6	Colorimetric tubes • Be aware of the operating principle of colorimetric tubes • Understand the correct use of colorimetric tubes • Be aware of the limitations of colorimetric tubes	3.2.6	比色管 ☐ • 了解比色管的操作原理 ☐ • 了解比色管的正确使用 ☐ • 了解比色管的局限性
3.2.7	Mixed exposure to solid/liquid/aerosol/gases • Be aware of the techniques available for mixed phase sampling	3.2.7	接触固/液/喷雾/气体 ☐ • 了解混合相取样用技术

3.2.8	Sampling trains • Understand how the different components of a sampling system connect together to form the sampling train • Understand how the sampling train is attached to the worker	3.2.8	取样器 □ • 了解形成取样器的取样系统的不同组成部分 □ • 了解取样器如何与作业人员相连。
3.2.9	Collection efficiency • Be aware of the collection efficiency of common sampling devices	3.2.9	采集效率 □ • 了解常见取样设备的采集效率
3.2.10	Sample stability • Be aware of how minimise sample loss between sampling and analysis	3.2.10	样本的稳定性 □ • 了解如何最大限度地减少取样和分析之间的样本损失
3.2.11	Diffusive (“passive”) samplers • Understand the basic operating principle of a diffusive sampler • Be aware of the different types of diffusive sampler • Be aware of the relative advantages and disadvantages of diffusive samplers	3.2.11	扩散（“被动”）取样器 □ • 了解扩散取样器的基本作业原理 □ • 了解不同类型的扩散取样器 □ • 了解扩散取样的相对优势和劣势
3.3	<i>Direct Reading Instruments</i>	3.3	<i>直读式仪器</i>
3.3.1	Portable, fixed-site or personal devices • Be aware of the operating principles of common direct reading instruments • Understand the nature of the information provided by such instruments	3.3.1	便携式，固定或个人设备 □ • 了解常见直读式仪器的操作原理 □ • 了解该等仪器所供信息的性质
3.3.2	Intrinsic safety of instruments • Be aware of the need for the use of intrinsically safety instruments in some environments	3.3.2	仪器的本质安全性 □ • 了解本质安全性仪器在某些环境中的需求
3.3.3	Real-time analysis • Be aware of the uses of real-time measurements for training and other purposes	3.3.3	实时分析 □ • 了解实时测量用作培训和其他用途
3.3.4	Direct reading uses • Understand the appropriate use of direct reading instruments and their limitations	3.3.4	直读式仪器的用途 □ • 了解直读式仪器的相关用途及其局限性
3.3.5	Instruments for particulates • Be aware of the common types of instruments available for direct reading measurements of particulate	3.3.5	微粒仪器 □ • 了解适于直读微粒浓度测量的常见仪器类型

- concentrations
- 3.3.6 Instruments for gases and vapours
- Be aware of the common types of instruments available for direct reading measurements of gas and vapour concentrations
- 3.4 *Calibration of Air Sampling Equipment*
- 3.4.1 Flow rate
- Primary standards
- Understand what primary standards are and how they are used in flow rate calibration
- Secondary standards
- Understand what secondary standards are and how they are used in flow rate calibration
- 3.4.2 Known concentrations
- Standard atmosphere generalisation
- Be able to use standard atmospheres to calibrate direct reading equipment
- Primary and secondary standards
- Understand the difference between primary and secondary standards

4 Sample Analysis (5%)

- 4.1 *Trace Level Analytical Methods*
- 4.1.1 Basic techniques and applications
- Know the analytical techniques used for common hazardous substances
- 4.1.2 Detection limits, sensitivity, chemical interferences
- Understand how detection limits and sensitivity of such techniques will affect the sample volume required
 - Understand how chemical interferences may bias results
- 4.1.3 Sources of methods
- Be aware of the sources of standard sampling and analysis methods such as the NIOSH NMAM and HSE MDHS methods
- 4.2 *Gravimetric Analysis*
- 4.2.1 Weight variation
- Understand the common causes of weight variation and

3.3.6 气体和蒸汽用仪器

- • 了解适于直读气体和蒸汽测量的常见仪器类型

3.4 空气取样设备的校准

3.4.1 流速

主要标准

- • 了解什么是主要标准，以及其于流速校准中的使用方式

次要标准

- • 了解什么是次要标准，以及其于流速校准中的使用方式

3.4.2 已知浓度

标准大气泛化

- • 能够使用标准大气压来校准直读式设备
- 主要和次要标准
 - 了解主要和次要标准之间的区别

4 样本分析 (5%)

4.1 痕量级分析方法

4.1.1 基本技术及应用

- • 了解通用有害物质用分析技术

4.1.2 检测限度，灵敏度，化学干扰

- • 了解该种技术的检测限度和灵敏度将如何影响所需的样本量
- • 了解化学品干扰如何导致结果出现偏差

4.1.3 方法的来源

- • 了解标准取样和分析方法的来源，诸如国家职业安全与卫生研究院的分析方法手册和职业安全卫生署的有害物测定方法。

4.2 重量分析

4.2.1 重量差异

- • 了解重量变化的常见原

4.2.2	how they can be minimised Instrument sensitivity Understand the level of sensitivity of the technique and how this may affect the sample size required	4.2.2	因, 以及如何尽量减少重量差异 仪器灵敏度 了解该技术的灵敏度等级, 以及对所需要样本量的影响
4.2.3	Cost of analysis Be aware of the relative cost of using this technique	4.2.3	分析的成本 了解使用该种技术的相对成本
4.2.4	Specificity Understand what this type of information this type of measurement provides	4.2.4	特异性 了解该种类型测量所提供的信息的类型
4.3	<i>Microscopy</i>	4.3	<i>显微镜</i>
4.3.1	Fibre identification – asbestos Be aware of the technique used for the measurement of asbestos fibre concentrations	4.3.1	纤维鉴别- 石棉 了解石棉纤维浓度测量的技术
4.4	<i>Quality Assurance of Analysis</i>	4.4	<i>分析的质量保证</i>
4.4.1	Internal quality control Understand the importance of internal quality control in analysis	4.4.1	内部质量控制 了解分析的内部质量控制的重要性
4.4.2	External quality assessment Be aware of the function of external quality assessment schemes in improving reliability of laboratory measurements	4.4.2	外部质量评估 了解外部质量评估方案对改善实验室测量可靠性的作用

5 Hygiene Standards (10%)

- 5.0.1 Principles of calculation/setting of standards
 - Be aware of how hygiene standards are set
- 5.0.2 Standards used in other countries
 - Be aware of commonly used international hygiene standards
- 5.0.3 Application of standards
 - Understand how exposure measurements relate to hygiene standards
 - Understand how hygiene standards are used to protect worker health
- 5.0.4 Definitions, terminology, units
 - Understand the terminology commonly used in association with standards
 - Understand the relationship between ppm and mg m³ for gases and vapours
- 5.0.5 Sk', 'Sen' notations
 - Understand the meaning of

5 卫生标准(10%)

- 5.0.1 计算原理/标准的设置
 - 了解卫生标准设置的方式
- 5.0.2 其他国家使用的标准
 - 了解常用的国际卫生标准
- 5.0.3 标准的应用
 - 了解接触测量与卫生标准的关系
 - 了解卫生标准保护作业人员健康的方法
- 5.0.4 定义, 术语, 单位
 - 了解相关标准中的常用术语
 - 了解气体和蒸汽单位 ppm或毫克立方米之间的关系
- 5.0.5 Sk', 'Sen' 符号
 - 了解皮肤标记的含义

	the skin notation				□ • 了解致敏符号的含义
	Understand the meaning of the sensitiser notation				
5.0.6	Problems		5.0.6	问题	□ • 了解可能需要标准不同解释的情况
	Be aware of situations that may require different interpretation of standards				
5.0.7	Limitations		5.0.7	局限性	□ • 了解在该背景下接触标准的局限性
	Be aware of the limitations of exposure standards in the light of this background				
6 Biological Monitoring (10%)			6 生物监测 (10%)		
6.0.1	Biological monitoring		6.0.1	生物监测	□ • 了解常用生物监测方法
	Be aware of common methods of biological monitoring				
6.0.2	Biological effect monitoring		6.0.2	生物效应监测	□ • 了解生物监测和生物效应监测的区别
	Understand the difference between biological monitoring and biological effect monitoring				
6.0.3	Metabolites		6.0.3	代谢产物	□ • 了解代谢产物的测定在生物监测中的作用
	Be aware of the role of measurement of metabolites in biological monitoring				
6.0.4	Target organs		6.0.4	靶器官	□ • 了解靶器官如何影响监测技术的选择
	Be aware how the target organ may affect the choice of monitoring technique				
6.0.5	Local action		6.0.5	局部措施	□ • 了解局部和整体措施之间的区别
	Understand the difference between local and systemic actions				
6.0.6	Biological half-life		6.0.6	生物半衰期	□ • 了解生物半衰期在生物监测中的意义
	Understand the significance of biological half-life in biological monitoring				
6.0.7	Sample timing		6.0.7	取样时间	□ • 了解如何规划生物取样的时间
	Be aware of how to plan the timing of biological sampling				
6.0.8	Biological standards		6.0.8	生物标准	□ • 了解生物标准的来源，了解其如何应用。
	Be aware of the sources of biological standards and understand how they are applied				
6.0.9	Confidentiality		6.0.9	机密性	□ • 了解处理生物取样数据时保持机密性的需求
	Be aware of the need of confidentiality when dealing with biological sampling data				
7 Calculation, Interpretation and Presentation of Results (10%)			7 计算，解释和结果呈递(10%)		
7.1	Numerical Evaluations		7.1	数值评估	
7.1.1	Time-weighted average airborne concentration		7.1.1	时间加权平均气载浓度	□ • 能够计算TWA的数值
	Be able to calculate TWA values				

7.1.2	Standardised format	7.1.2	标准格式
	Be able to present calculations in a standardised format		☐ • 能够以标准格式显示计算结果
7.2	Interpretation	7.2	解读
7.2.1	Relevance of the calculated result	7.2.1	计算结果的关联性
	Understand the significance of exposure measurements		☐ • 了解风险测量的意义
7.2.2	Overall accuracy	7.2.2	整体精度
	Be aware of the elements that effect the overall accuracy of measurements		☐ • 了解影响测量总体准确性的因素
7.3	Presentation of Results	7.3	结果的呈递
7.3.1	Relevant information	7.3.1	相关信息
	Be able to organise and present data in a relevant format		☐ • 能够采用相关格式组织和显示数据
7.3.2	Interpretation of data	7.3.2	数据的解读
	Be able to provide useful and appropriate interpretation of data		☐ • 能够提供有用和恰当的数据解读
7.3.3	Recommendations	7.3.3	建议
	Be able to make relevant and appropriate recommendations based upon exposure measurements		☐ • 能够根据风险测量制定适当相关的建议

Learning and Teaching Activities

教学活动

Learning Time [hours]

学习时间[小时]

Scheduled contact hours: (Note these timings are indicative only)	预定的接触时	Lectures	课堂讲授	16
		Seminars	专题讲座	2
		Practical Sessions	实践课程	8
		Tutorials	专题报告	8
		Examinations	考试（包括准备）	3
		Other scheduled time	其他计划内事项	
Guided independent study <i>Note: include in guided independent study preparation for scheduled sessions, follow up work, wider reading or practice, revision</i>	具有引导	Independent	独立的课程作业	8
		Independent	独立的实验室作业	
		other non-scheduled time	其他计划外事项	
Total Hours	总学时			45

Assessment Details

评估详情

Methods of Assessment	Practical Assessment	Open Book Examination
评估方法	实践评估	开卷考试
Grading Mode	Formative	Summative
分级模式	形式	总结性
Weighting %	NR	100%
比重%	NR	100%
Pass Mark	NR	Set by the Examining Body
合格分数	NR	由考试结构设置
Outline Details	All candidates must participate in the practical studies and demonstrate the required skills. The studies should be designed by the course tutor(s) to test the basic skill and knowledge of each of the candidates in the techniques of personal sampling for the assessment of personal exposure. The exercises must, therefore, involve: • The setting up and calibration of sampling pumps for vapour sampling with charcoal tubes. The flow calibration should be carried out using basic equipment such as a soap bubble meter and stop watch rather than the more sophisticated equipment now used by experienced staff in the field. • The set up and use of both a cyclone sampler for respirable dust and an open faced sampler for inhalable dust. This must include the weighing of filters, preferably GFA, before and after a sampling sequence to demonstrate that the candidates have the requisite manipulative skills needed in this procedure. • The correct positioning of sampling equipment on the wearer. Full details of the practical requirements and the individual candidate reporting forms etc. are available in document JA.2 Practical Evaluation Report which is available from www.bohs.org and www.ohlearning.com	40 short answer questions to be answered in 120 minutes. The questions require candidates to write short answers which will require no more than the box provided but may include multiple answers. Some questions may require calculations. Students can only refer to the W501 student manual during the examination.

细节概述	所有考生必须参加实务研究，证明其具备所需技能。 研究内容应由课程导师负责设计，以测试每位考生掌握的个人接触评估的个人取样技术的基本技能和知识。 - 因此，该练习应包括如下内容： 采用比色管取样的蒸汽取样泵的设置和校准；流速校准应采用基本设备，如皂膜流量计和秒表，不应采用当前经验丰富的员工所采用的复杂设备。 - 可吸入粉尘用气旋取样器和呼吸性粉尘用开口式取样器的设置和使用。必须包括过滤器的称重，最好是取样前后的 GFA，用以证明考生具备本工序所需的必要操作技巧。 - 佩戴者正确放置取样设备。 欲知实务要求以及各个考生报告格式等详细内容，请登陆 www.bohs.org 或 www.ohlearning.com 索取JA.2实务评估报告。	应在120分钟内简单回答40个问题。考生需要写下问题的答案，只需要勾选答案即可，可能上多选项。某些问题需要计算。 学员在考试过程中可以参考W501学生手册。
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Is the student required to pass ALL elements of assessment in order to pass the course? Yes

是否要求学员必须通过所有评估要点？ 是

Indicative Course Materials and Reading:
指导教材和阅读

ISBN Number	Author	Date	Title	Publisher
ISBN 编号	作者	日期	标题	出社
	OHTA		W501 Measurement of Hazardous Substances student manual book <i>Downloadable for free from www.ohlearning.com</i>	OHlearning
	OHTA		W501有害物质测量学员手册 <i>登陆www.ohlearning.com免费下载</i>	OHlearning
978174175084	Cherilyn Tillman (ed)	2007	Principles of Occupational Health and Hygiene	Allen & Unwin
978174175084	Cherilyn Tillman (ed)	2007	职业健康与卫生原则	Allen & Unwin
978-1-4051 – 5962-3	John Cherrie and Sean Semple	2010	Monitoring for Health Hazards at Work 4 th edition	Blackwell Science
978-1-4051 – 5962-3	John Cherrie and Sean Semple	2010	作业时健康危害的测量，第4版	Blackwell Science
			The Occupational Environment – Its Evaluation and Control (the “White Book”) published by AIHA Press	AIHA
			职业环境 - 及其评估与控制（“白皮书”），AIHA 出版社出版	AIHA
			Air Sampling Instruments for the evaluation of atmospheric contaminants published by ACGIH	ACGIH
			大气污染物评估用空气取样仪器，ACGIH 出版	ACGIH
			HSE Guidance HSG Series	HSE
			HSE的 HSG系列指导丛书	HSE
			HSE Guidance MDHS Series	HSE
			HSE的 MDHS系列指导丛书	HSE
			NIOSH NMAM Methods	NIOSH
			NIOSH NMAM 方法	NIOSH
			NIOSH Sampling Strategy Manual	NIOSH
			NIOSH 取样策略手册	NIOSH
		1996	BSEN 689:1996 Workplace atmospheres – Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategies, ISBN 0 580 25420 8	EN
		1996	BSEN 689:1996业场所空气 -对吸入的化学试剂与极限值比较的评估及测量方法指南 ISBN 0 580 25420 8	EN
			BOHS Technical Guide No 15 Direct Reading Instruments	BOHS

			BOHS 技术指南第15号直读式仪器	BOHS
			ILO Chemical Control Toolkit	ILO
			国际劳工组织化学控件工具包	ILO