July 2010

Examiners' Report

NEBOSH National Diploma in Occupational Health and Safety- Unit B

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NEBOSH LEVEL 6 DIPLOMA IN OCCUPATIONAL HEALTH AND SAFETY

Unit B: Hazardous agents in the workplace

JULY 2010

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Introduction

NEBOSH (The National Examination Board in Occupational Safety and Health) was formed in 1979 as an independent examining board and awarding body with charitable status. We offer a comprehensive range of globally-recognised, vocationally-related qualifications designed to meet the health, safety, environmental and risk management needs of all places of work in both the private and public sectors. Courses leading to NEBOSH qualifications attract over 25,000 candidates annually and are offered by over 400 course providers in 65 countries around the world. Our qualifications are recognised by the relevant professional membership bodies including the Institution of Occupational Safety and Health (IOSH) and the International Institute of Risk and Safety Management (IIRSM).

NEBOSH is an awarding body to be recognised and regulated by the UK regulatory authorities:

- The Office of the Qualifications and Examinations Regulator (Ofqual) in England
- The Department for Children, Education, Lifelong Learning and Skills (DCELLS) in Wales
- The Council for the Curriculum, Examinations and Assessment (CCEA) in Northern Ireland
- The Scottish Qualifications Authority (SQA) in Scotland

NEBOSH follows the *"GCSE, GCE, VCE, GNVQ and AEA Code of Practice 2007/8"* published by the regulatory authorities in relation to examination setting and marking (available at the Ofqual website www.ofqual.gov.uk). While not obliged to adhere to this code, NEBOSH regards it as best practice to do so.

Candidates' scripts are marked by a team of Examiners appointed by NEBOSH on the basis of their qualifications and experience. The standard of the qualification is determined by NEBOSH, which is overseen by the NEBOSH Council comprising nominees from, amongst others, the Health and Safety Executive (HSE), the Confederation of British Industry (CBI), the Trades Union Congress (TUC) and the Institution of Occupational Safety and Health (IOSH). Representatives of course providers, from both the public and private sectors, are elected to the NEBOSH Council.

This report on the Examination provides information on the performance of candidates which it is hoped will be useful to candidates and tutors in preparation for future examinations. It is intended to be constructive and informative and to promote better understanding of the syllabus content and the application of assessment criteria.

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General comments

Many candidates are well prepared for this unit assessment and provide comprehensive and relevant answers in response to the demands of the question paper. This includes the ability to demonstrate understanding of knowledge by applying it to workplace situations.

There are always some candidates, however, who appear to be unprepared for the unit assessment and who show both a lack of knowledge of the syllabus content and a lack of understanding of how key concepts should be applied to workplace situations.

In order to meet the pass standard for this assessment, acquisition of knowledge and understanding across the syllabus are prerequisites. However, candidates need to demonstrate their knowledge and understanding in answering the questions set. Referral of candidates in this unit is invariably because they are unable to write a full, well-informed answer to the question asked.

Some candidates find it difficult to relate their learning to the questions and as a result offer responses reliant on recalled knowledge and conjecture and fail to demonstrate any degree of understanding. Candidates should prepare themselves for this vocational examination by ensuring their understanding, not rote-learning pre-prepared answers.

Common pitfalls

It is recognised that many candidates are well prepared for their assessments. However, recurrent issues, as outlined below, continue to prevent some candidates reaching their full potential in the assessment.

- Many candidates fail to apply the basic principles of examination technique and for some candidates this means the difference between a pass and a referral.
- In some instances, candidates are failing because they do not attempt all the required questions or are failing to provide complete answers. Candidates are advised to always attempt an answer to a compulsory question, even when the mind goes blank. Applying basic health and safety management principles can generate credit worthy points.
- Some candidates fail to answer the question set and instead provide information that may be relevant to the topic but is irrelevant to the question and cannot therefore be awarded marks.
- Many candidates fail to apply the command words (also known as action verbs, eg describe, outline, etc). Command words are the instructions that guide the candidate on the depth of answer required. If, for instance, a question asks the candidate to ‘describe’ something, then few marks will be awarded to an answer that is an outline.
- Some candidates fail to separate their answers into the different sub-sections of the questions. These candidates could gain marks for the different sections if they clearly indicated which part of the question they were answering (by using the numbering from the question in their answer, for example). Structuring their answers to address the different parts of the question can also help in logically drawing out the points to be made in response.
- Candidates need to plan their time effectively. Some candidates fail to make good use of their time and give excessive detail in some answers leaving insufficient time to address all of the questions.
- Candidates should also be aware that Examiners cannot award marks if handwriting is illegible.

UNIT B – Hazardous agents in the workplace

Section A – *all questions compulsory*

Question 1

(a) ***Describe*** *the physiological effects of carbon monoxide on the body.* ***(4)***

(b) ***Outline*** *the control measures that could be used to reduce exposure to carbon monoxide in a motor vehicle repair premises.* ***(6)***

Part (a) of the question was designed to assess candidates' knowledge of the physiological effects of carbon monoxide on the body and the symptoms that might be experienced by persons exposed to the gas. Answers should have referred to carbon monoxide being absorbed via the lungs into the bloodstream and displacing the oxygen by chemically bonding to haemoglobin, hence reducing the oxygen carrying capacity of the blood and reducing the supply of oxygen to tissues. Carbon monoxide is only slowly displaced from the body and its symptoms should have included reference to drowsiness, headaches, dizziness, breathlessness, unconsciousness and, ultimately, death. This part of the question was well answered though there were but few candidates who referred to the slow displacement of carbon dioxide from haemoglobin. Candidates should strive to use anatomical detail when describing the effects. This question was not primarily asking candidates to describe the symptoms the person would experience.

There were good answers too to the second part of the question with candidates outlining control measures that should be introduced in the given scenario including minimising the duration of engine running time, providing local exhaust ventilation attached to the vehicle exhaust pipe, providing a good standard of general ventilation for the workshop and inspection pits, carrying out regular maintenance of the ventilation systems, using a carbon monoxide monitor or alarm, providing specific information, instruction and training for the employees and isolating or segregating the area from customers.

Question 2

Demands, control, support and relationships are categories used in the Health and Safety Executive 'stress management standards'.

For ***EACH*** *of these four categories* ***outline*** *the occupational factors that could contribute to stress amongst call centre workers.* ***(10)***

The category 'demands' in the standards includes issues such as workload, work patterns and the work environment. In the scenario described, factors that could contribute to stress amongst the call centre workers include work overload or underload dependent on the number of calls waiting in a queue for answer and meeting sales or promotional targets that have been set; unacceptable work patterns with the centre operating a seven day, twenty four hour system and operators having to take their breaks at the workstation; and a poor work environment resulting from the inadequate provision of lighting and heating and high noise levels.

The ‘control’ category refers to the amount of control the workers may have in the way they do the job and this could be minimal if there is no consultation with them either individually or in team meetings on call volumes and the avoidance of repetition in the way the work is carried out.

The ‘support‘ category, addresses factors that might increase the stress placed upon workers when they are not given encouragement and/or praise for good work from management and colleagues, when they are not given the opportunity to raise concerns or problems and when they see that no resources are provided for example, for them to receive further training and so advance their careers.

The final category ‘relationships’ refers to the steps taken to ensure workers do not have to deal with conflict or put up with unacceptable behaviour. This would include dealing with aggressive customers and bullying and harassment by managers all of which might be exacerbated by cultural differences and the fact that because of the working arrangements, such as one to one phone calls, they do not have the opportunity to establish relationships with colleagues.

Most marks were gained in those parts of the answers dealing with support and relationships with few making any contribution on the categories of demand and control. There was often little attempt made to relate to a call centre environment and a few candidates ignored the ‘signposts’ given in the wording of the question. Some perhaps misread the question and outlined control measures rather than contributory occupational factors.

Question 3 *A machine operator is required to work at a number of different machines during a normal 8-hour working day.*

(a) ***Explain*** *how a series of static measurements can be taken in the workplace and then used to estimate the operator’s daily personal noise exposure ($L_{EP,d}$).* ***(5)***

(b) *The result of personal dosimetry on a similar day provides an $L_{EP,d}$ that is 4dB(A) greater than the estimate made in (a).*

Identify *the factors that may account for the difference.* ***(5)***

For part (a), candidates should have explained that static measurements would have to be taken at the operating positions of each machine during normal operation of the machines. This would involve measuring the equivalent continuous A-weighted sound pressure L_{Aeq} at each machine using an integrated sound level meter. A note would need to be taken of the time the operator spends at each machine. The operator’s daily personal exposure can then be calculated using a nomogram or an alternative such as the electronic spread sheets to be found on the HSE web site. This part of the question was not well answered with many candidates showing little knowledge of static noise measurement or understanding of the terms L_{EPd} and L_{Aeq}.

Answers to part (b) were to a better standard with candidates seemingly more comfortable in identifying factors such as the actual operator position was not represented when the static measurement was taken; different machines, materials and machine speeds were used and there was a presence of other noise sources. Other factors would include those associated with techniques such as static measurements taken over too short a period of time with the possibility that peak levels were missed; other significant noise exposure that might occur between jobs or during breaks was not taken into account; and errors were made in calibration or the use of static measurement equipment together with the possibility that reflected sound from the body might lead to an increased measurement.

Question 4 *The most widely used and accepted index for the assessment of heat stress in industry is the Wet Bulb Globe Temperature (WBGT) index.*

(a) ***Identify*** *the measurements that need to be taken to determine the WBGT index.* ***(3)***

(b) ***Outline*** *the principle of operation of the instruments that should be used to make the measurements.* ***(7)***

This question was not generally well answered with few candidates showing an understanding of the WBGT index for the assessment of heat stress and of the measurements that need to be taken to determine the index with some unable to differentiate between the WBGT index and relative humidity. The measurements necessary include the wet bulb temperature, the air or dry bulb temperature and the radiant or globe temperature.

For part (b), candidates were expected to outline that for the wet bulb temperature, a thermometer with the bulb wrapped in a wetted cloth or sock is used. The water evaporates from the bulb causing it to cool. The bulb cools to below the ambient temperature giving a measured wet bulb temperature.

Air temperature is measured using an alcohol/mercury or digital thermometer. The liquid in the tube expands as the temperature rises and a reading obtained from a marked scale or digital display.

A black globe thermometer is used to measure radiant temperature. A mercury filled thermometer is encased in a black painted copper sphere and the radiant heat is absorbed without being influenced by air currents.

Knowledge of the operation of the necessary instruments was limited with few able to outline how a black globe thermometer worked and some even confusing it with a dry bulb thermometer.

Question 5

(a) *Use the data below to **calculate** the 8-hour Time-Weighted Average (TWA) exposure to a solvent for a factory worker. Your answer should include detailed working to show your understanding of how the exposure is determined.* ***(7)***

Working Period (Total shift time = 8 hours)	Tasks undertaken by worker	Exposure to solvent (ppm)
08.00 – 10.30	Weighing ingredients	140
10.30 – 10.45	Break	0
10.45 – 12.45	Charging the mixers	100
12.45 – 13.45	Lunch	0
13.45 – 15.45	Cleaning equipment	25
15.45 – 16.00	Assisting maintenance staff	0

Assuming that exposure is zero during all other times

(b) ***Explain THREE** of the 'principles of good practice' that should be considered when deciding if the control of exposure can be treated as 'adequate' under the Control of Substances Hazardous to Health Regulations (COSHH).* ***(3)***

There were some good answers provided for the first part of the question with candidates explaining that in order to calculate the 8-hour time-weighted average, each time period and exposure need to be multiplied together, then added including the periods of zero exposure and the total divided by eight. From the data provided this would result in the following calculation:

[(140x2.5)+(0x0.25)+(100x2)+(0x1)+(25x2)+(0x0.25)]/8 =
350+200+50+0+0+0 =
600/8 = 75 ppm.

Candidates must remember to include the correct units with the answer they give. Care should be taken to reflect the period of time accurately as a fraction of an hour i.e. 15mins = 0.25 hours).

For part (b), candidates were expected to give an explanation of the 'principles of good practice' to be used when adjudicating on the adequacy of the control of exposure under COSHH. Examples of the principles include those dealing with design and operation of the processes and activities to minimise emission; the need to take into account all relevant routes of exposure not just inhalation; the need for the periodic checking and review of control measures to ensure their continuing effectiveness; the occasions when personal protective equipment may have to be used alongside other control measures; the provision of information and training to employees; and the need to avoid increasing the overall risk to health and safety by the introduction of selected control measures. The 'principles of good practice' were not well explained and many candidates based their answers solely on the use of the hierarchy of control.

Question 6 *Street cleaning operatives working for a local authority can be at risk from exposure to the hepatitis B virus.*

Outline** a range of practical control measures that could be used to minimise the risk of exposure to hepatitis B.* ***(10)

This question was well answered with most able to outline practical control measures that could be used to minimise the risk of exposure to hepatitis B including the use of litter picking sticks to minimise the risk of puncture wounds; the prohibition of eating and drinking during normal periods of work; the use of personal protective equipment such as goggles, gloves and footwear; covering up wounds with waterproof dressings; the safe disposal of sharps in a suitable container and frequent hand washing.

In addition to these practical controls, candidates could have mentioned the need to provide information and training to the employees on the nature of the risk and the precautions to be taken together with the introduction of procedures for the collection of contaminated waste such as body fluids, blood and contaminated clothing; for cleaning up body fluids and blood and for the action to be taken following a needle stick injury such as the encouragement of bleeding and rinsing the wound under warm water before covering it with a dressing.

Section B – *three from five questions to be attempted*

Question 7 *Manual handling risk assessments should consider a range of risk factors concerning the task, load, environment and individual.*

(a) ***Explain** how these risk factors relate to nursing staff who carry out manual handling activities when assisting hospital patients with limited mobility.* ***(14)***

(b) ***Outline** specific activities that the occupational health department at the hospital could undertake to minimise the risk to nursing staff who undertake manual handling.* ***(6)***

This question asked candidates to consider how, in carrying out a manual handling risk assessment, the risk factors concerning the task, load, environment and individual might relate to nursing staff assisting patients with limited mobility in a hospital situation where manual handling is one of the highest risk areas.

This was a very popular question but was not particularly well answered. In considering the task, the nurses would have to assist the patients to carry out a number of tasks such as bathing, washing and dressing and these activities would frequently involve stooping, bending, stretching, pulling and lifting, often resulting in the staff adopting extreme postural stances. The tasks are carried out frequently and often for prolonged periods dependent on the shift length. Other risk factors associated with the task included the number of patients requiring care and that the work often involves the use of equipment such as lifting aids and hoists.

In considering the load factor, this might be difficult to assess or estimate, since no two persons are the same and some may not be able to do much for them selves. Additionally, the patient's movements may be unpredictable, and while some may have lapsed into unconsciousness, others may struggle, become unwilling to be assisted and may even become violent. There is also the possibility that medical apparatus such as drips or splints could be attached to the patient which could make it difficult to secure a hold.

Risks associated with the environment would include space constraints and obstructions particularly around beds and in bathrooms and toilet areas, while the floors could become slippery because of spillages and the standard of lighting, particularly at night, might be limited.

From an individual's point of view, nurses would need to be physically capable of carrying out the tasks and be given special training in patient moving and handling. Those who are pregnant or who might themselves suffer from lumbar or muscular problems would be more at risk.

Candidates who did attempt the question generally coped well with the risk factors associated with the environment and the individual though there were some who thought the individual referred to the person being lifted. The load risk factors however caused problems.

Answers to part (b) were generally satisfactory with most candidates outlining that the occupational health department could play a part in minimising the risk to nursing staff by assisting in the assessment of manual handling tasks and assessing by pre-employment and return to work examinations, the physical capabilities of those expected to be involved in manual handling activities. Should any of the staff suffer injury, they would need to be treated and then provided with a rehabilitation programme to prepare them for a return to work. The department should also play a part in the investigation of accidents involving manual handling and in monitoring and recording the absences resulting from this type of incident. Finally, they could have a proactive part to play by carrying out manual handling training and advising on safe lifting techniques and the use of mechanical aids.

Question 8 *You are a health and safety advisor to a large warehousing company who employ a significant number of fork-lift truck drivers.*

Outline** the key points that should be included in the company policy and procedures on drug misuse.* ***(20)

The policy should initially contain a general statement setting out: the organisation's aims,(such as to ensure that drug misuse does not have a detrimental effect on the work of the employees); that sufficient resources would be allocated to ensure the aims were achieved; the responsibilities for carrying the policy into effect such as those of management, employees and occupational health staff; those who would be covered by the policy such as the organisation's own employees and those of contractors; and the definition of drug misuse including the use of prohibited and the misuse of prescription drugs with the proviso that those employees who were obliged to take prescription drugs would have to make this known to the organisation.

More detailed procedures would then have to be drawn up for matters such as the circumstances in which drug testing would be carried out such as in pre-employment examinations, following any forklift truck accident or incident, and randomly as a safety measure for all drivers; the practical arrangements for testing and for analysing samples taken; the procedures to be followed after a positive test or a refusal to provide a sample and the procedures for appeal. The policy should also contain a clear statement on the sanctions that would be taken following a positive test whether dismissal, suspension or re-deployment. Finally it would be beneficial to explain what help and advice would be available for employees who are found to have a drug problem recognising that treatment might result in absence from work which would be treated as normal sick leave and setting out the arrangements for return to work and re-instatement following treatment.

Some candidates decided to outline the key points of a policy on alcohol misuse, while others who did read the question correctly concentrated on the policy but did not consider the accompanying procedures. There was also a tendency to generalise rather than to be specific about the contents of both the policy and procedures.

Question 9 *The use of hand-held vibrating tools can cause hand-arm vibration syndrome (HAVS).*

(a) ***Describe*** *the health effects of HAVS.* ***(4)***

(b) ***Outline*** *the factors to consider when carrying out a risk assessment of employees who make extensive use of hand-held vibrating tools in their work.* ***(6)***

(c) ***Outline****, with practical examples, a range of control measures that could be used to reduce the risk of employees developing HAVS.* ***(10)***

There were many good descriptions of the health effects of HAVS including damage to the peripheral nervous system leading to vascular disorders such as vaso-constriction; neurological disorders such as numbness, tingling and a loss of sensation; loss of dexterity and grip; gangrene in severe cases; blanching of the skin and carpel tunnel syndrome with the possibility of joint or tendon damage.

Good answers to part (b) of the question would have referred to factors such as identifying tools and tasks where there is exposure to vibration and the duration of the exposure; the number of people involved and their individual predisposition to vibration related disorders as a result of smoking or an existing health condition; the **magnitude** (rather than the word “amount”) and frequency of the vibration; the measurements of the vibration magnitude with the aid of an accelerometer and their comparison with the exposure action and limit values contained in the Control of Vibration at Work Regulations; the temperature of the working environment and the extent of use of existing control measures. Candidates seemed unsure of the factors to be considered when carrying out a risk assessment, and some were unable to distinguish between risk factors and control measures.

For part (c) most candidates were able to outline control including changing the process or using automation to avoid the use of handheld tools; replacing the equipment with a lower vibration model; the introduction of job rotation with frequent breaks from using the handheld tools; introducing a system of regular maintenance and lubrication to ensure vibration was kept to its designed level; providing warm clothing and a warm environment to encourage good blood circulation; and the introduction of pre-employment health screening to identify any predisposition to vibration related disorders.

Question 10 *You have been sent a copy of a 'local exhaust ventilation (LEV) examination and test report' conducted by an external organisation. The report relates to an LEV system in one part of your company's production area. The production manager has asked you to comment on the suitability of this report before the company commissions further LEV examination and testing work throughout the rest of the factory.*

(a) ***Outline*** *the measurements that you would expect to have been taken as part of the examination and test of the LEV system.* ***(4)***

(b) *In addition to these measurements* ***outline*** *other information that should be contained in the report.* ***(16)***

This was not a popular question but was generally well answered by those who chose it. Measurements that should have been taken in examining and testing the LEV system should have included the face velocity across the hood or opening; the capture velocity; the duct velocity; the pressure drop across the filter or fan; the static pressure in the hood or duct and the fan/motor speed and the power consumption. Candidates should be familiar with these specific terms and should avoid more general terms such as air speed.

The report should additionally contain information such as the name and signature of the person carrying out the examination together with evidence of his competence and the date the examination was carried out together with the date of the previous examination and test so that an assessment can be made as to whether the interval between them was appropriate in accordance with the requirements of the COSHH Regulations. The report should also clearly identify the location and extent of the LEV system being examined and the process and hazardous substance it is intended to control. A diagram of the layout of the system with the test points marked should be attached as should also information on the system's designed performance, its commissioned performance and that noted at the last test. As for the current test and examination, the report should note the conditions which appertained at the time, either normal or special; and should state the methodologies and equipment used to measure the performance of the system such as, for example, anemometers, manometers or pitot tubes which will enable a decision to be made as to whether the methodologies used are in line with those set out in the relevant HSE Guidance. Other matters which should be addressed in the report include the calibration of the measuring equipment; a record of the actual measurements and observations made; results of any air sampling relevant to the performance of the LEV system or emissions to atmosphere; details of adjustments or minor repairs made to improve the effectiveness of the system and any remaining repairs or alterations that are required to restore its performance and whether advice has been given to the recipient of the report that the record should be maintained for a period of five years.

Those candidates who did not produce particularly good answers seemed to lack practical experience of the scenario described and consequently had little to offer with their responses lacking the technical detail that was required. Few candidates made reference to HSG 258.

Question 11 *Employees of a landscaping contractor regularly cut kerb stones using a powered circular saw. This task requires the use of Personal Protective Equipment (PPE) to protect against hazards associated with handling and cutting stone.*

(a) *For **EACH** type of PPE that should be used, **outline** the reasons why these items of PPE are needed.* ***(6)***

(b) *Assuming that suitable PPE has been selected **outline** a range of practical measures that can be taken to ensure the correct use of the PPE and to maintain its effectiveness.* ***(2)***

Even though some candidates may have been unfamiliar with the work activity concerned, they should have been able from the information supplied to identify the personal protective equipment that would be needed. For example the activity will generate significant noise and therefore hearing protection would be needed. Likewise, dust will be generated, and this will require respiratory protective equipment and candidates were expected to give an indication of what form this should take. In similar manner, perhaps by working down the body from head to toe, and bearing in mind the hazards associated with the operation, other items of equipment might have been identified and the reasons for their use outlined. Answers to this part of the question were to a reasonable standard though it would have been preferable if candidates had referred to the provision of respiratory protective equipment rather than to a 'dust mask'.

In order to ensure that the personal protective equipment provided is regularly and correctly used, employees will need to be given information on the risks associated with the work they carry out and how the equipment will give protection against these risks. They should then be given training on the correct method for putting on and fitting the equipment, how to remove it without contaminating themselves, how to recognise defects and damage, how to obtain replacements when needed and where and how to store the equipment when it is not in use. Management and supervision will have a part to play in ensuring the effective use of the equipment, firstly by wearing it themselves and setting a good example, then by issuing constant reminders to the workforce, perhaps when necessary using disciplinary measures in the case of persistent offenders, carrying out inspections of the equipment for damage, issuing replacements when needed and keeping records of the items that have been withdrawn and replaced. Candidates could also have stressed the importance of the employer carrying out a periodic review of the selected items of equipment to check their compatibility and whether different models might be used to obtain combined protection such as for example for eye and respiratory protection. In this process the views of and complaints from users would be invaluable.

There were generally not enough practical measures provided for this part of the question. Despite the wording of the question to the effect that personal protective equipment had been selected, many candidates referred to the need for consultation with the workforce, together with trials of various types of equipment.

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