July 2011

Examiners' Report

NEBOSH National Diploma in Occupational Health and Safety - Unit B

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NEBOSH NATIONAL DIPLOMA IN OCCUPATIONAL HEALTH AND SAFETY

Unit B: Hazardous agents in the workplace

JULY 2011

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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 one or more of the questions 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 a sufficient 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. Similarly the command word ‘identify’ requires more information than a ‘list’.
- 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.
- Candidates should note that it is not necessary to start a new page in their answer booklet for each section of a question.

UNIT B – Hazardous agents in the workplace

Section A – *all questions compulsory*

Question 1 *A catalogue distribution company employs 300 employees as drivers, warehouse operatives and office staff, processing telephone and internet orders.*

***Identify** the possible functions of this company's occupational health department:*

(a) when new employees commence employment; ***(5)***

(b) when an employee returns to work after ill-health. ***(5)***

When new employees commence employment the occupational health department would have an important part to play in carrying out the screening of the employees and reviewing their health history so that they might be in a position to advise management on their suitability for the work for which they have been chosen. In particular they would need to check the fitness and ability of potential warehouse staff to undertake manual handling tasks, check the eyesight of drivers whether of road or internal vehicles and also screen them for evidence of the possible misuse of alcohol or other substances. Additionally it would be important to carry out eyesight tests on those who would be employed in the office to use display screen equipment. Very few candidates acknowledged the new Equality Act in their responses and continued to refer to pre-employment screening which is now not permitted while others did not link the health check to the specific activity of the employee.

As for those employees preparing to return to work after a period of ill-health, an assessment of their current health condition would enable recommendations to be made to management on whether the return should be phased or whether the employee should be redeployed on other or lighter duties. This would necessitate liaison with the employee's GP, and responding to the requirements of a fit note. There would also be occasions when counselling would be necessary and making arrangements for or even providing rehabilitation treatment in house. There were few candidates who referred to the fit note, liaison with the GP or counselling. As a general comment, there were a few candidates who identified the various functions of an occupational health department without referring them specifically to the scenario described.

Question 2 *A company producing pre-prepared pasta dishes requires operatives to pick up small pasta pieces from a delivery conveyor and transfer them to foil trays on a separate conveyor. This work is carried out standing in front of the conveyors on an 8 hour shift basis.*

Following complaints from a number of employees about pains in their arms and shoulders you have been asked to undertake an ergonomic risk assessment for this operation and make recommendations.

(a) ***Identify*** *the ergonomic risk factors to be taken into account when making such an assessment* ***AND outline*** *how these may be contributing to the problems experienced by the employees in this situation.* ***(5)***

(b) *Total automation of the process is not possible.* ***Outline*** *other control measures that could be taken to reduce the ill-health effects being experienced by employees.* ***(5)***

In carrying out an ergonomic risk assessment of the operation described in the scenario, the factors that would need to be taken into account include the repetitive nature of the task involving frequent movements of the upper body to pick up the pasta and place it in foil trays; fatigue due to standing; the continuous operation over an eight hour shift; the posture adopted by the operators including standing and reaching from one conveyor to another; the expected work rate and the speed of the conveyors; the height of the conveyor in relation to that of the employees and the total pattern of continuous work with the number and length of the breaks allowed.

In answering the second part of the question, candidates were expected to suggest control measures such as adjusting the height of the conveyors and re-positioning them in parallel; arranging the work so that it might be carried out from both sides of the conveyor to prevent over reaching; providing seating for the operators to enable them to change their position from time to time; reducing the speed of the feed conveyor; introducing job rotation with other less demanding tasks; providing information to the employees on the benefits of changing their posture and stretching on a regular basis; and encouraging them to report any problems that might arise.

In general this question produced some good answers though there were some candidates who produced a general ergonomic risk assessment without addressing the issues contained in the scenario and taking into account the specific type of work involved. A few referred to the heavy load that was being handled whilst some, despite the wording of the question, proposed the introduction of automation.

Question 3

(a) ***Explain*** *the meaning of the term 'carcinogen'.* ***(2)***

(b) ***Outline*** *the role of Workplace Exposure Limits (WELs) when deciding if exposure to a carcinogen is 'adequately controlled' for the purposes of the Control of Substances Hazardous to Health (COSHH) Regulations 2002.* ***(2)***

(c) *Under COSHH exposure to substances hazardous to health (including carcinogens) shall only be treated as adequate if the 'principles of good practice' are applied.*

Outline SIX *of these principles.* ***(6)***

A 'carcinogen' is an agent that causes cancer; has the ability to produce malignant tumours, attacks cell reproduction mechanisms; causes changes in cell's DNA resulting in abnormal cells and uncontrollable growth; and produces effects that are irreversible and continue well after the initial exposure. Most candidates were only able to define a carcinogen as something that causes cancer.

For part (b), few candidates were able to outline that exposure to a carcinogen is adequately controlled when a WEL, if one exists, is not exceeded and when exposure is reduced to the lowest level that is reasonably practicable.

For part (c), candidates were expected to give an outline 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 control exposure by measures that are proportionate to the health risk; the choice of the most effective and reliable control options which minimise the escape and spread of the substances hazardous to health; 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 provision of suitable personal protective equipment when adequate control of exposure cannot be completely achieved by other means; the provision of information and training to employees on the hazards and risks from the substances they use in their work and the use of the control measures that have been introduced to minimise the risks; and the need to ensure that the introduction of the selected control measures does not increase the overall risk to health and safety. The last part of the question was not well answered with few candidates demonstrating a knowledge and understanding of the principles of good practice. A number described the hierarchy of control which was not what was required.

Question 4

(a) ***Give*** *the meaning of the term 'biological monitoring'.* ***(2)***

(b) ***Outline*** *the circumstances in which biological monitoring may be appropriate.* ***(4)***

(c) ***Outline*** *the practical difficulties that an employer must take into account when introducing a programme of biological monitoring.* ***(4)***

Answers to the first part of this question should have stated that biological monitoring is concerned with the measurement or assessment of hazardous substances or their metabolites in tissues, secretions, excreta or expired air. It became clear that many candidates did not understand the principles of biological monitoring with some confusing biological monitoring with biological agents and interpreting the term as testing for infections from biologically active agents in the atmosphere by air sampling.

For part (b), candidates should then have outlined that biological monitoring is a complementary technique to air monitoring or sampling and can be used to determine if existing controls are adequate; when information is required on the accumulated dose in a target organ; when there is a specified guidance value against which a comparison might be made (such as in EH 40); when there is significant absorption by non-respiratory routes; in circumstances when there is significant reliance on personal protective equipment; and where required by statute such as for example the Control of Lead at Work Regulations. There was little conception of the circumstances in which biological monitoring might be appropriate and no evidence of familiarity with the current ACOP for the COSHH Regulations. There was a suggestion, however, that it might be useful to determine whether employees were abusing drugs or alcohol, which could not be awarded a mark.

There was an improvement in the responses for part (c), with many candidates referring to practical difficulties such as the fact that, apart from the monitoring required by statute, biological monitoring would normally be conducted on a voluntary basis. Consequently the informed consent of those involved would have to be obtained and their concerns overcome. Other difficulties include the availability of suitable facilities or a location to carry out the monitoring especially if this has to be done at the end of the shift; the availability of specialists to carry out the monitoring for example if blood samples are to be taken; maintaining the integrity of samples to avoid cross contamination and ensuring there was no possibility of cross infection; the fact that there are few guidance values available for comparison; that exposure may be non-occupational and finally the cost involved in carrying out the exercise.

Question 5 *Drivers of tracked earth moving machinery at a large construction site have reported incidences of back pain which they believe are caused by exposure to whole body vibration.*

(a) ***Outline*** *a range of control measures that could be used to minimise the risk of the drivers experiencing back pain caused by exposure to whole body vibration.* ***(7)***

(b) ***Outline THREE*** *other possible work-related causes of the back pain being experienced by these drivers.* ***(3)***

Control measures that could be used to minimise the risk to drivers of tracked vehicles from exposure to whole body vibration include selecting a vehicle with the size power and capacity best suited for the terrain and task; ensuring that an individual's exposure to whole body vibration is kept below the exposure limit value and preferably the exposure action value; organising traffic routes to avoid rough uneven surfaces wherever possible; fitting suspension seats with vibration damping characteristics and adjusting these to suit the weight of individual drivers to avoid "bottoming out"; organising work patterns including job rotation to ensure that drivers have breaks away from the vehicle and advising them on how to minimise exposure to whole body vibration by avoiding jolts and shocks and carrying out maintenance on a regular basis on site roadways and the vehicles. Answers to this part of the question were sometimes limited. There were very few references made to the Control of Vibration at Work Regulations and particularly to the exposure limit and action values. It was suggested that the machines should be replaced with others that had fewer vibrating characteristics and more surprisingly that the tyre pressures on the tracked vehicles should be checked on a regular basis.

Answers to part (b) were to a much better standard with candidates able to suggest other possible work related causes for the back pain such as: poor posture; sitting for long periods of time; the poor layout of controls requiring the driver to stretch and twist to reach a particular control or to obtain good vision; no method provided for adjusting the seat which could make hand and foot controls difficult to operate; the repeated climbing into and jumping down from a high cab and carrying out other construction related activities such as the manual handling of heavy loads.

Question 6 *A housing association employs 20 housing officers. They regularly visit a range of rented properties to interview existing tenants and to show prospective tenants around vacant properties.*

Outline *a set of practical guidelines that the housing officers can follow in order to minimise their risks from violence and aggression whilst undertaking these work activities.* ***(10)***

Guidelines for all visits could include agreeing appointments with tenants in advance; informing management or colleagues of visit details before any visit by use of a visit log; reporting back between visits and scheduling visits only during daylight hours. Every employee should carry a mobile phone and a personal alarm; refrain from carrying valuables such as a laptop and park their vehicle for easy access to and exit from the area. Other precautions should include avoiding confrontation during the visit and if it does occur attempting to calm the situation or retreat; ensuring that there is always a clear exit route from the property; if possible using a code word or signal to indicate difficulty to colleagues at the office and reporting any incidents that do occur.

For visits to existing tenants, research should be carried out to establish if there is a history of problems and in such cases it would be necessary to visit in pairs or reschedule the interview for the office. Research with other agencies should also be made to check on prospective tenants so that again appropriate precautions such as paired visits could be taken when showing them around a vacant property.

This question was well answered but some introduced issues which would have been more suitable for a 'policy' rather than a 'practical guideline' question.

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

Question 7 *A large livestock farm employs a number of people who are involved in caring for animals, cleaning out animal enclosures and disposing of waste materials.*

The farm manager has identified that during such work employees may be exposed to zoonoses.

(a) ***Give*** *the meaning of the term 'zoonose'.* ***(2)***

(b) *Cryptosporidiosis and Leptospirosis are two commonly occurring zoonoses.*

Outline *how and when the farm employees are likely to be exposed to* ***EACH*** *of these.* ***(6)***

(c) ***Outline*** *a range of practical control measures that should be used to minimise the risks associated with exposure to zoonoses.* ***(10)***

(d) ***Identify TWO*** *other zoonoses that employees working on the farm could be exposed to.* ***(2)***

A 'zoonose' may be defined as an animal disease or infection that may be transmitted to humans. Whilst the disease or infection will cause ill-health to humans, it may not necessarily cause ill-health in animals. Definitions offered were generally acceptable though some candidates, whilst they were aware that a zoonose was an animal infection, did not seem to appreciate that it might cause ill-health in humans.

For part (b), candidates were expected to outline that farm employees are likely to be exposed to cryptosporidiosis when in contact with cattle or sheep. The exposure may occur via ingestion following hand to mouth transmission, through contact with surfaces or footwear contaminated with faeces while clearing out enclosures, and when there is a poor standard of personal hygiene such as a failure to carry out regular hand washing. As for leptospirosis, exposure may take place after contact with cattle or rat urine via broken skin such as cuts or grazes, or via the mucous membranes in the eye, nose or mouth when cattle urine has splashed into an individual's face. Leptospirosis seemed to be better understood than cryptosporidiosis where candidates seemed a little unsure as to how employees might be exposed.

In outlining practical control measures that should be used to minimise the risks associated with exposure to zoonoses, candidates could have referred to the necessity for employees to practise a high standard of personal hygiene; the provision of rest areas away from the animals provided with clean drinking water and separate hand washing facilities including hot water, soap and paper towels or a hand drier so that employees may wash their hands and arms before eating and drinking; avoiding the use of tools or equipment likely to damage the skin and if damage should occur, covering the resultant cuts or grazes with waterproof dressings; maintaining good standards of hygiene in livestock areas by regular cleaning and disinfecting and the removal of faeces; wearing suitable personal protective equipment such as gloves and overalls, eye and face protection to avoid urine splashes and respiratory protective equipment to avoid aerosol inhalation; leaving work wear and personal protective equipment at the workplace for cleaning; controlling the disease in the animals for example by vaccination; and ensuring that all employees are made fully aware of the risks of exposure to the disease when handling cattle and the precautions that must be observed. The outlines of control measures provided were a little vague and often addressed those which should be put in place to protect visitors rather than employees.

For part (d), most candidates identified the required number of zoonoses from a list comprising bovine tuberculosis, salmonella, streptococcus suis, orf, psittacosis, Q fever and ringworm.

Question 8 *A large manufacturer uses hydrochloric acid in a large open tank to remove rust from sheet steel. This creates acid mist in the immediate work area and the company has decided to install a local exhaust ventilation (LEV) system. This system consists of an inlet, ducting, air cleaner, air mover and exhaust.*

(a) *For **EACH** of the components listed above **outline** the design features required for the LEV system to be effective.* ***(10)***

(b) ***Explain** the requirements of the Control of Substances Hazardous to Health (COSHH) Regulations 2002 for inspection and testing of the LEV system.* ***(3)***

(c) *The LEV system breaks down and will take a number of weeks to repair. In the meantime the employees will need to use respiratory protective equipment (RPE) to control their exposure to the acid mist.*

Outline** factors to be considered when selecting the RPE to protect the employees whilst engineers are repairing the LEV system.* ***(7)

For part (a), candidates were required to outline the essential design features of the listed components. The hood would need to be of a suitable size to cover the tank and have a face velocity adequate to capture the acid mist. Because of the acidic nature of the contaminant, the ducting would have to be corrosion resistant, be smooth with rounded bends, of size appropriate for the required transport velocity and provided with access for testing and maintenance. The air cleaner would probably be by means of a wet scrubber, possibly in combination with an alkali neutraliser, with appropriate means for disposing of effluent. The fan, either axial or centrifugal, would need to be corrosion resistant, of sufficient power to provide the necessary extraction velocity and be designed to minimise noise generation.

The exhaust outlet should be located following consideration of all environmental implications including noise, should be corrosion resistant and should be fitted with a weather cowl and deflector baffles to prevent the entry of vermin. Answers to this part of the question were to a good standard though some candidates seemed to forget the corrosive nature of acidic mist and suggested a particle filter rather than a wet scrubber whilst others were a little vague on the design features necessary for the exhaust outlet.

In part (b) candidates were expected to know the requirements set out in Regulation 9 of the COSHH Regulations 2002. A periodic visual inspection of a local exhaust ventilation system together with a thorough examination and test must be carried out by a competent person at least once in every period of fourteen months. A record of the examinations must be kept available for at least five years from the date on which they were carried out. Most candidates knew the answer to this part of the question though not everyone mentioned the periodic visual inspection.

For part (c), factors to be considered in the selection of the equipment would be its type either full face or half mask, the protection factor required, the selection of the correct cartridges with respect to the acid mist and the battery life of the chosen equipment. Task related factors would also be important such as the degree of movement required by the wearer, their work rate, the compatibility of the respirators with other personal protective equipment such as eye protection and the comfort factor. Cost factors would also have to be considered such as those involved in the maintenance and storage of the equipment and that which would be necessary to provide training for the user in fit testing for close fitting respirators. Most answers made reference to the majority of the above factors.

Question 9

(a) ***Identify BOTH*** *the acute* ***AND*** *chronic effects that could result from exposure to ultra-violet (UV) radiation.* ***(4)***

(b) *A leisure spa is planning to install UV tanning equipment. The equipment uses UV sources with a higher intensity than normal sunlight in order to accelerate tanning.*

Outline *control measures that should be put in place for* ***BOTH*** *employees* ***AND*** *customers for the safe operation of this facility.* ***(16)***

For part (a), the acute effects that could arise from exposure to UV radiation are erythema or sun burn, dryness of the skin, and eye irritation or arc eye. The chronic effects could well be premature skin ageing, cataracts and skin cancer. There was much confusion in the answers between the acute and chronic effects of exposure to UV radiation.

For part (b), control measures that should be put in place both for employees and customers would initially entail taking into account the individual's risk factors such as skin type, medication, pregnancy and family skin cancer history and recommending and restricting their time of exposure. This would also involve preventing the exposure of persons under the age of eighteen (as now required by the Sunbeds Regulation Act). The tanning equipment would require screening or enclosure, it would be advisable to display safety advice to customers by way of signs and posters, and employees' workstations would need to be located away from stray UV radiation.

Employees should be made aware of the risks of exposure to UV radiation and then provided with instruction and training in the operation of the equipment. This would include information on the safety controls of the equipment and features fitted such as the timer and emergency alarm; the maintenance that should be carried out on a regular basis such as calibrating the timer and changing the tubes and making a re-assessment of the level of exposure when the change has taken place; carrying out pre-user checks and cleaning the equipment between customers; the necessity of using the eye protection provided; instructing customers on the operation of the equipment and ensuring that any children who accompany a customer are not exposed to radiation. It would also be necessary for the employees to advise customers on the duration and frequency of exposure, on the risks associated with exposure to UV radiation and the precautions to be taken whilst maintaining records of customer exposure would be a sensible procedure to follow.

This part of the question was well answered with many structuring their answers between the control measures required for the employees and those required for the customers. Some candidates did suggest the use of film badges which indicated they were not aware that UV was not ionising radiation.

Question 10

(a) ***Describe*** *the ways the body may defend itself against inhaled dusts.* ***(12)***

(b) *A company uses a substance in the form of a powder, which is added directly to a mixing vessel from sacks, during the manufacture of paints.*

Outline *the practical control measures that could be used to minimise exposure during the addition.* ***(8)***

For the first part of this question candidates were expected to describe that the body's first line of defence is the nasal hairs which trap and filter out dust particles greater than ten microns in size. Mucus in the nose and mouth also traps these particles which are subsequently ejected by sneezing, blowing the nose and spitting. Dust particles between five and ten microns tend to settle in the mucus covering the bronchi and broncioles and are wafted upwards by tiny hairs – the ciliary escalator – towards the throat. They are then coughed and spat out. Particles smaller than five microns are more likely to reach the lung tissue. These particles are ingested by macrophages – a type of white blood cell – in a process known as phagocytosis and transported back to the ciliary escalator or to the lymphatic system. They may also be transported across the alveolar membrane into the blood stream. Answers to this part of the question were generally acceptable though there was a little confusion between particle sizes and the different parts of the defence mechanism.

For part (b), candidates should have realised that simply by following the hierarchy of controls, they could have produced an acceptable response. In the first instance, they should have recognised that elimination of the coloured powder was not an option since the colour range was required. Consequently they were expected to outline practical control measures such as introducing the colouring agent in a pellet or dye solution form. If this was not possible, then the powder could be fed into the mixing vessel by means of an automated hopper feed system and screw conveyor with the powder being emptied into the hopper through an opening provided with local exhaust ventilation. A vacuum cleaner should be used to clear up spillages and employees should be provided with personal protective equipment such as overalls, gloves and goggles. Some form of respiratory protection would also have to be provided. If the dust was thought to be nuisance only, then a particle filtering face piece – a disposable face mask – changed on a regular basis could suffice. However, a filter respirator would have to be worn if the powder were found to be harmful.

Despite asking for practical controls, some candidates included provision of training and health surveillance.

Question 11 *A small printing company operates a number of printing machines which are located in an open plan workshop. Following a noise survey the company discovers that their employees are being exposed to noise levels of 86dB(A) $L_{EP,d}$.*

(a) ***Outline*** *the significance of this noise level to an employer.* ***(5)***

(b) ***Describe*** *the range of technical* ***AND*** *organisational control measures that could be introduced.* ***(15)***

In answering part (a) of the question, candidates were expected to outline that the quoted noise level of 86dB(A) $L_{EP,d}$, whilst below the exposure limit value of 87dB(A) $L_{EP,d}$, was above the upper exposure action value of 85dB(A) $L_{EP,d}$. Consequently, the employer would need to reduce the exposure to a level as low as reasonably practicable by means other than hearing protection. Failure to introduce the necessary control measures could result in enforcement action being taken. Additionally, long term exposure to the current noise level could cause damage to employees' hearing which could possibly result in claims for noise induced hearing loss and increased insurance premiums. It was initially encouraging to note that most candidates had moved on from the former Regulations. However, it transpired that many were unfamiliar with the terminology in the 2005 Regulations still referring to the first and second action levels instead of the EAV and ELV. More importantly, as far as the question was concerned most were unable to explain the legal and practical significance of the noise level to the employer.

For part (b), which required practical approach, candidates were able to describe a range of technical controls such as: replacing older/noisier equipment with machines that emitted lower levels of noise; isolating the noisier machines in a separate area of the workshop, reducing their speed and building a noise enclosure of suitable noise attenuating material around them; mounting the noisy equipment on rubber strips or dampers; lining the walls and floor of the workshop with acoustically absorbing material and applying damping to metal panels on machines; and creating a noise haven for the employees. If, even after taking the above measures, the provision of hearing protection was found to be necessary, and not many suggested this would be the last resort, it should be chosen based on an octave band analysis measurement of the noise emitted in order to provide the best overall reduction in exposure.

Organisational controls include reducing exposure times by job rotation; designating hearing protection zones; providing training to employees on the risks associated with exposure to noise and on the fitting and maintenance of hearing protection; ensuring hearing protectors, once issued, were used and introducing disciplinary procedures to deal with those employees who did not wear them and providing health surveillance for all employees based in the workshop.

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