



UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE

BSc DEGREE IN ENVIRONMENTAL HEALTH SCIENCES

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TITLE OF PAPER : HEALTH RISK MANAGEMENT

COURSE CODE : EHS 332

TIME : 2HOURS

TOTAL MARKS : 100

INSTRUCTIONS:

- 1. QUESTION 1 IS COMPULSORY**
- 2. ANSWER ANY OTHER THREE QUESTIONS**
- 3. ALL QUESTIONS ARE WORTH 25 MARKS EACH**
- 4. BEGIN THE ANSWER TO EACH QUESTION IN A SEPARATE SHEET OF PAPER.**

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QUESTION 1

Multiple choices: Write True or False against each letter corresponding to the following statements as they apply to acoustics.

- a) The primary reason for conducting a workplace assessment is to assess the risk(s) to the health of employees.
- b) A hazard is something that can cause harm if not controlled.
- c) Arisk is a combination of the probability that a particular outcome will occur and the severity of the harm involved.
- d) Risk assessment is about identifying sensible measures to control the risk(s) in the workplace.
- e) Occupational health management is about improving workplace conditions and eliminating illness and disability related to work
- f) Most of the chemical and physical agents found in industry today are potentially harmful if they are handled correctly or are present in excessive quantities in the workplace environment.
- g) Dose-response assessment is the relationship between level and probability of effect
- h) Improvement in the workplace conditions and increase of illness or disability are due to actions within the workplace and result from the implementation of risk prevention and control measures.
- i) Occupational Exposure Limit (OEL) is the airborne concentration of chemical agents and levels of physical agents and represents conditions under which it is believed that nearly all workers may be repeatedly exposed day after day with adverse effect.
- j) The hazards associated with wood dusts are mainly from inhalation and skin contact.
- k) Coal mining has long been associated with the dust induced lung disease 'Pneumoconiosis' and other illnesses such as work related 'Emphysema'.

(22 marks)

- II. Name three factors that the degree of risks to health from welding fumes, if inhaled or swallowed, depends on.

(3 marks)

QUESTION 2

Using the information in the case study below:

- a) Identify high exposure group **(3 marks)**
- b) Conduct a SHE risk assessment on high exposure group. **(8 marks)**
- c) Propose controls and measures **(6 marks)**

Case study

Fanas (PTY) Ltd has a coal mine. The company has a Chief Executive Officer and 10 administrative staff members.

The coal is mined with the use of a continuous miner. Recycled water is used for dust control purposes. Two hundred employees climb 30 flights of stairs, with 50 each, covering approximately 3km to the coalface. Supervisors visit 3 similar workplaces a day. Operations managers visit one coalface every week.

Raw coal received from the mine is offloaded by means of a tipper and conveyed to be stored in open bunkers, blending beds and silos. Before the coal is loaded into the ovens it is crushed into smaller particles and sieved into a couple of size fractions by a screening process. Each fraction is sent through various washing and separation processes. 10 workers oversee this process.

Exposure monitoring shows that the OEL-TWA was exceeded.

The crushed coal is then conveyed from the overhead coal bunkers by conveyer belts to a charging car at the Coke oven to be charged. 2 employees walk up and down the conveyer belt covering 100m every hour. The charging car removes the charge hole covers and dumps the coal into the oven by opening its charge bin gates. Because crushed coal is used the working environment is polluted with coal dust. The oven covers are replaced as the car moves to collect some more coal.

As the ovens are charged vast amounts of smoke and dusts occur. Coke oven and blast furnace gases are used as fuel to heat the coal in the oven. Blast furnace gases contain a high percentage per volume carbon dioxide, carbon monoxide, and nitrogen. 20 operators continuously complain about headaches, fatigue and nausea, irritation of the upper respiratory tract and burning of eyes and noise.

An employee collects gas samples every 30 minutes. He transports the samples to the laboratory where 20 employees are continuously doing qualitative and quantitative analysis on the gases.

At the end of the coking period the pusher machine operator push the coke (cake) with a pusher bar out of the oven. Understandably, large amounts of gas and dust are released during this process. The operator of the guide machine on the opposite side of the oven aligns the guide machine exactly opposite the pusher machine. Two assistants remove the side door to allow the coke to be pushed out of the oven. The quench car, pushed around by the quench loco, collects the coke underneath the oven the ovens and transports the coke to the quench tower, where water is spread over the coke to prevent it from burning. During this process a large quantity of steam, and also fine coke particles, and even organic and inorganic matter may pollute the working environment. During the process a faint smell of rotten egg is noticeable.

The clay running on the same track as the guide machine is used to seal the openings between the doors and the doorframes to prevent gas escaping the ovens. To allow operators to seal the entire door (4m high) the car can lift the operator alongside the

door. The cleaning of the doors and frames is essential before it is being replaced to ensure optimisation of the process.

SHE data

The following SHE data is provided.

Athletes foot	10 cases are treated (on average)
Fall of ground	15 incidences per year with an average fatality rate of 10 per annum
Hand injuries	360 minor hand injuries are recorded
silicosis	10 miners have been diagnosed with the disease
Dermatitis	4 laboratory employees suffer from an allergy due to the use of latex gloves.
Ergonomics	3 employees (weighing 110kg and are 2.0 m tall) working on the continuous miner continuously complain about backaches
Airflow	At face is 0.5 m/s Within silos 10 – 15 m/s
Heat survey	An average of 29.5 degrees Celsius recorded on top of the Coke ovens during the months of June, July and August.
Noise survey	Personal noise exposure at the face, a Leq of 110dB(A) Personal noise exposure at the screens, an average Leq of 95 dB(A)
General	The administrative staff visits the clinic on a regular basis complaining of headaches and fatigue
TB	The prevalence rate for TB is 20%
HIV/AIDS	10% of the workforce, primarily the miners suffer from HIV/AIDS

Existing control procedures

All employees are supplied with:

- Hard hats
- Safety shoes
- 2 sets of overalls
- Vibraphones

All employees are subjected to:

- Medical examination tests including a physical examination and audiometric tests as well as X-Rays and lung function tests.
- An induction programme, which inter alia covers the hazards, and risks associated with the work being conducted.

- d) Define occupational health (3 marks)
- e) Define occupational health services (5 marks)

QUESTION 3

- a) Describe the functions listed in the ILO Convention on occupational Health Services (No. 161) (9 marks)
- b) Describe a health and safety risk management framework (16 marks)

QUESTION 4

Describe the hazard substances management procedures under the following headings;

- a) Material Safety Data Sheets (MSDSs) (8 marks)
- b) Receipt of chemical products on site (5 marks)
- c) Storage facilities (9 marks)
- d) Sampling (3 marks)

QUESTION 5

- a) Describe the requirements of a valid measurement as applied in occupational hygiene. (3 marks)
- b) Describe the purposes of the legal provision in the ILO Convention on Occupational Health Services (no. 161) (5 marks)
- c) Risk assessment and hazard control
 - i. Identifying and assessing risks (10 marks)
 - ii. The hierarchy of control (5 marks)
 - iii. Employee participation in risk assessment (2 marks)

APPENDIX 1

Consequence			
Catastrophic (10% mortalities)	10% mortalities or damage > E10m	P: mortality recorded; E: Large irreversible impact	100
Disaster (5% mortalities)	5% mortalities or damage > E5m	P: mortality possible; E: moderate irreversible impact	40
Very serious (1% mortalities)	1% mortalities or damage > E1m	P: mortality unusual; E: minor irreversible impact	15
Serious (10% permanent illness)	10% permanent disabilities or damage > E0.5m	P: permanent disability recorded; E: large irreversible impact	7
Serious (5% permanent illness)	5% permanent disabilities or damage > E0.1m	P: permanent disability possible; E: moderate irreversible impact	6
Serious (1% permanent illness)	1% permanent disabilities or damage > E 20 000	P: permanent disability unusual; E: minor irreversible impact	5
Serious (10% temporary illness)	10% temporary disabilities or damage > E 10 000	P: temporary disability recorded; E: large controlled release	4
Serious (5% temporary illness)	5% temporary disabilities or damage > E 5 000	P: temporary disability possible; E: moderate controlled release	3
Serious (1% temporary illness)	1% temporary disabilities or damage > E 2 000	P: temporary disability unusual; E: minimal controlled release	2
Of concern (10% minor illness)	(10% minor disabilities or damage > E 1 000	P: complaint recorded; E: large nuisance	1
Of concern (5% minor illness)	(5% minor disabilities or damage > E 500	P: complaint possible; E: moderate nuisance	0.5
Of concern (1% minor illness)	(1% minor disabilities or damage > E 200	P: complaint unusual; E: minor nuisance	0.1

P = Public, E = Entertainment

Calculation	Classification	Action
400 and above	Eliminate	Consider to discontinue
250-399	Very high risk	Immediate correction required
150-249	High risk	Correction needed
70-149	Medium risk	Indicate attention necessary

20-69	Low risk	Little attention necessary
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Table 2: Risk classification

QUANTITATIVE AND QUALITATIVE RISK ASSESSMENT EXPOSURE

- Continuous for 8 hour shift (10)
- Continuous for between 2 and 4 hours (6)
- Continuous for between 1 and 2 hours (3)
- Short periods of time (a few times per month) (2)
- Unusual (a few times per year) (1)
- Rare (yearly) (0.5)
- Exceptionally exposed (0.1)

PROBABILITY OF EXCEEDING OEL

- Exceeding OEL-C (10)
- Exceeding OEL-STEL (6)
- Exceeding OEL-TWA (3)
- Exceeding action level (50% of TWA) (1)
- Exceeding 25% of TWA (0.5)
- Exceeding 10% of TWA (0.2)
- Virtually impossible (approaches the impossible) (0.1)