

PE8403/ health safety Environmental Management
in petroleum industries.

Unit-II
Part B & C

1. Define the term environmental monitoring and discuss its advantages and limitations:-

Definition

→ Environmental monitoring or management is the process of measuring and assessing workplace conditions to evaluate health risks to workers.

→ This practice is especially important in businesses that use hazardous substances such as heavy metals.

→ It includes periodic health examinations of workers and environmental impact tests.

→ It describes the processes and activities that need to take place to characterise and monitor the quality of the environment.

→ Environmental monitoring is used in the preparation of environmental impact assessments, as well as in many circumstances in which human activities cause a risk of harmful effects on the natural environment.

→ All monitoring strategies and programmes have reasons and justifications which are often designed to establish the current status of an environment or to establish trends in environmental parameters.

Monitoring allows you to:-

* Anticipate damage or deterioration that might be seen within your collections.

* Determine if your overall conditions are within the range of generally accepted best practice.

* Identify areas that require remediation.

* Develop strategies to improve the environmental conditions.

* Monitoring environmental control equipment to ensure it is working properly

* Develop a sustainable environment based on collections, staff and financial requirements.

→ The four most important are

- Temperature (T)
- Relative Humidity (RH)
- Light
- Pollutants.

→ Temperature and relative humidity monitoring equipment can be divided into two types.

- Spot measuring devices
- Continuous recording devices.

Air Quality monitoring

→ Air pollutants are atmospheric substances both naturally occurring and anthropogenic - which may potentially have a negative impact on the environment and organism health.

Air Sampling:

→ passive or "diffusive" air sampling depends on meteorological conditions such as wind to diffuse air pollutants to a sorbent medium.

Soil monitoring :-

→ Soil monitoring involves the collection and/or analysis of soil and its associated quality, constituents and physical status to determine or guarantee its fitness for use.

Water Quality Monitoring

- Chemical
- Biological.
- Radiological
- Microbiological.

Advantages:-

- Preventing occupational diseases
- Improving the company's public image
- Reducing environmental pollution.

Disadvantages:-

- Staff and cost negativity
- cost - cost involved can vary considerably,
- Time and resources
- Too burdensome
- Training cost.

2. Classify the effects on human by noise and also control methods, reduction strategies for noise in petroleum industries:-

Classification:-

⇒ Hearing loss, perception of noisiness and masking are produced along the auditory pathway and are thus direct and specific effects of noise.

⇒ Interference with performance, rest and sleep, a feeling of discomfort and physiological effects are produced as indirect and non-specific effects via reticular formation of the mid brain.

⇒ Annoyance is not merely a feeling of unpleasantness but the feeling of being bothered or troubled.

Control methods:

- Control of noise at source
- Reduction of noise in the work place
- Reduction of exposure by personal protection.
- Allocation of manpower and co-ordination
- Training of staff to implement the program.

Control of noise at source

→ The sources of excessive noise levels should be identified and the noise should be analyzed using the instructions described in Appendix A.

→ An attempt should be made to reduce the noise emission to an acceptable degree by checking the performance, maintenance and operating characteristics of the source.

→ Faculty lubrication, imbalance, excessive wear, loose fittings, structural transmission are common cause of increased noise level.

Reduction of noise in the workplace:

- Attenuation (using materials with high density as enclosures)
- Isolation (reducing transmitted noise by flexible mountings, couplings).
- Damping (of metal parts and loose mountings)
- Sound absorption (by using materials with high sound absorptive coefficients for given frequencies)
- Separation of operators and plant.

Reduction of Exposure by personal protection:

- Adequate attenuation
- Acceptable to wear
- perfect fit
- easy to clean
- easy to maintain

Allocation of manpower and coordination:-

- Initial surveys and monitoring of noise by trained technical staff.
- Attention to design, specification and modification of plant.
- Selection, procurement, issue, maintenance and cleaning of hearing protection.

→ Keeping of records.
Training to staff to implement the program:
* Basic noise measurement and recognition of the hazard.

* selection, use and maintenance of hearing protection.

* Medical surveillance including audiometry.

3. Explain the hierarchy of control measures for occupational health risk:-

Definition:-

→ Employers need to assess the risks for their staff, and then preventive measures or control measures have to be derived from this assessment.

→ The types of measures can be classified as;

* Elimination of the hazards (e.g :- designing new work processes)

* and if that is not possible minimizing and separating the hazards from the workers by.

(i) Technical Measures (e.g : wearing PPE)

(ii) organizational measures (eg : only qualified employees are allowed to do specified work.)

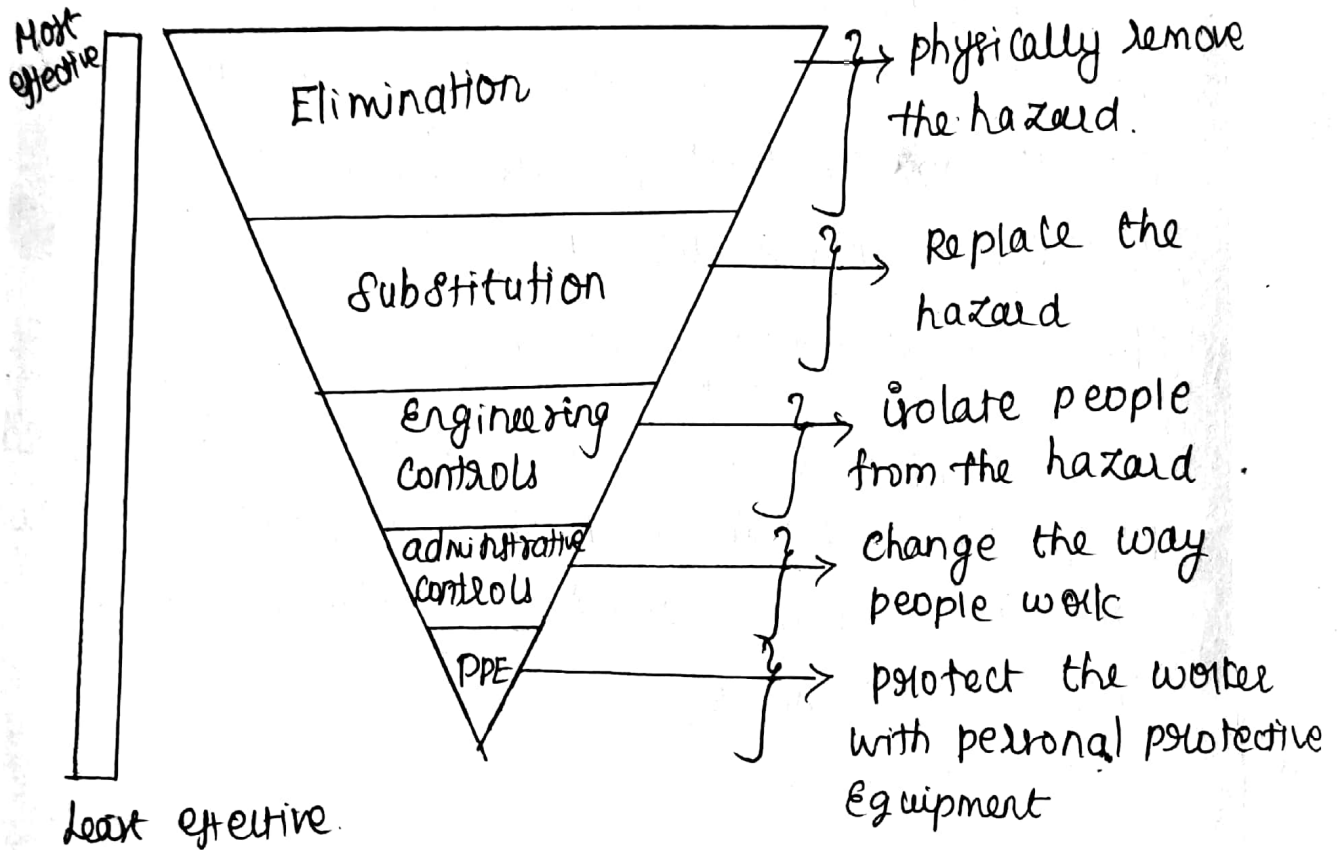
(iii) personal measures (e.g : wearing PPE)

(iv) behavioural measures (e.g: peer observation)

(4)

→ Risks may cause suffering, losses for companies and damage to our economy, and, as such, they should be avoided or, where this is not possible - reduced to a minimum.

Hierarchy of controls



Elimination:-

→ Remove the hazard from the workplace. It is most effective way to control a risk because the hazard is no longer present.

Substitution:-

→ Use a chemical that is less hazardous or less toxic than a principal ingredient in a synthesis for instance.

→ This may add more steps to the processes, but may be safer in the long run. Conduct a hazard assessment to verify.

Engineering Controls:-

→ Enclose or isolate the hazard with local exhaust ventilation, machine guarding, guardrails or other safety equipment.

Administrative Controls:-

→ Require workers to do things that reduce their exposure to a risk (e.g: standard operating procedures, safe work practices, safety training, warning signs, lockout (tagout, alarms, etc.))

Personal Protective Equipment:-

→ PPE (e.g: respirators, Fall protection, ear plugs, lab coat) is used when engineering controls are not available and/or to enhance existing engineering controls.

⑤
Q. What is occupational health and hygiene and discuss about its scope, practice and measurement control?

Definition :-

→ Occupational health is concerned with the control of occupational health hazards that arise as a result of or during work activities.

→ "Science and art devoted to the anticipation, recognition, evaluation and control of those environmental factors or stresses arising in or from the workplace, which may cause sickness, impaired health and well-being, or significant among workers or among the citizens of the community.

→ It encompasses the study of chronic acute conditions emanating from hazards posed by physical agents, chemical agents, biological agents and stress in the occupational environment and the outdoors environment.

→ Evaluation of the magnitude of the environmental factors and stresses arising in or from the work place is performed by industrial hygienist, aided by training, experience and quantitative measurement of the chemical, physical, ergonomic, or biological stresses.

Scope of Occupational health safety and hygiene :-

→ Establishment of sound sanitary condition within the work place such as water supply, waste disposal, canteen, cloak room, showers and hand washing facilities, sanitary and safe storage of chemicals.

- Organization of health services including first aid.
- Health promotion in the work environment.
- Rehabilitation of those that have been injured.
- prevention, diagnosis, and treatment of occupational related diseases and accidents.

Practice of occupational hygiene:

- The recognition of the possible health hazard in the work environment.
- The evaluation of hazards, which is the process of assessing exposure and reaching conclusions as to the level of risks to human health.
- prevention and control of hazards, which is the process of developing and implementing strategies to eliminate, or reduce to acceptable levels, the occurrence of harmful agents and factors in the workplace, while also accounting for environmental protection.

Measurement for control:

- source identification and characterization
- spotting of critical points in closed systems or enclosures (e.g: leaks)
- determination of propagation paths in the work environment.

- (6)
- ⇒ Comparison of different control interventions.
 - ⇒ Verification that respirable dust has settled together with the coarse visible dust, when using water sprays.
 - ⇒ checking that contaminated air is not coming from an adjacent area.
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Elaborate the things on hazard prevention and control.

Goal :-

→ The primary goal of occupational hygiene is the implementation of appropriate hazard prevention and control measures in the work environment.

→ standards and regulations, if not enforced are meaningless for the protection of workers health and enforcement usually requires both monitoring and control strategies.

→ when serious hazards are obvious, control should be recommended, even before quantitative evaluations - control are carried out. It may sometimes be necessary to change the classical concepts of "recognition - evaluation - control" to recognition - control, evaluation, or even to "recognition - control".

Hazard prevention approach

→ The most efficient hazard prevention approach is the application of engineering control measures which prevent occupational exposure by managing the work environment.

→ Engineering measures should be designed to prevent or reduce the spread of hazardous agents into the work environment by

* containing them

* Removing them immediately beyond the source

* interfering with their propagation

* reducing their concentration or intensity

→ Source reduction measures include substitution of materials, substitution/modification of processes or equipment and better maintenance of equipment.

→ workplace design, dilution or displacement ventilation, good housekeeping and adequate storage, labelling and warning signs can assist workers in safe work practices.

→ Monitoring alarm system

→ Work practices are an important part of control.

→ Other personal preventive measures include education, training, personal hygiene and limitation of exposure time.

→ Continuous evaluations, through environmental monitoring and health surveillance, should be part of any hazard prevention and control strategy.

→ Appropriate control technology for the work environment must also encompass measures for the prevention of environmental pollution.

6. Enumerate the classifications of occupational health, safety and hygiene hazards.

- Physical Hazards
- Mechanical Hazards
- Chemical Hazards
- Biological Hazards.
- Ergonomic Hazards
- Psychosocial Hazards.

Physical Hazards:-

→ Physical hazards has possible cumulative or immediate effects on the health of employees.

→ The physical hazard include: a) Extremes of temperature b) Ionizing radiation c) Non ionizing radiation d. Excessive noise.

* Ionizing Radiation - any electromagnetic or particulate radiation capable of producing ions is referred as ionizing radiation.

* Non-Ionizing Radiation - This is a form of it is electromagnetic radiation with varying effects on the exposed body.

* Excessive noise :- sound is any pressure variation or a stimulus that produces a sensory response in the brain.

Mechanical Hazards:

→ The mechanical hazards in industries are contributed from machinery, protruding and moving parts.

→ About 10% of accidents in industry are said to be due to mechanical cause. Examples of vibrating and rotating tools are those used in drilling holes to bury dynamite in road construction and grinding metals.

Chemical Hazards:-

→ There is hardly any industry, which does not make use of chemicals. The chemical hazards are on increase with the introduction of newer and complex chemicals.

→ Chemical hazards form the most important group and comprise over 10000 toxic materials.

Biological Hazards:

→ Any involvement with biohazards material may end up with infection.

→ when dealing with biological agents of which its etiology is not known it must be assumed that it is a bio hazard.

→ Bio Hazard can be transmitted through

- a * Inhalation
- * Injection
- * Ingestion
- * Contact with the skin.

Ergonomic Hazard:

→ An ergonomic hazard is a physical factor within the environment that harms the musculoskeletal system.

→ It include repetitive movement, manual handling workplace / job / task design, uncomfortable workstation height and poor body positioning.

Psychosocial Hazards:-

→ is any occupational hazard that affects the psychological well-being of workers, including their ability to participate in a work environment among other people.

7. What are the role of PPE (Personal protective equipment) and also write the selection criteria of PPE:-

→ To provide barriers against skin, mucous membrane and respiratory exposure to infectious agent to prevent the spread of contamination.

Selection of PPE based on :-

- Information of the nature and magnitude of the hazard.
- performance data on the PPE and/or device under consideration
- Level of residual risk resulting from exposure to the hazard as determined by the supervisor

How to select your PPE:

→ is familiarise with potential hazards and types of PPE available (Anticipate exposure & Durability and appropriateness of PPE to the task.

- Consider the hazard association with environments.
- Select PPE that ensures greater level of protection than minimum requirement.
- Make workers aware of limitation of PPE.

PPE policies and procedures:

- * Selection
- * Training
- * Fit testing
- * Use and Maintenance.

Types of PPE:

Eyes :-



Hazards: chemicals or metal splash, dust, projectiles, gas and vapour, radiation.

Options :- Safety spectacles, goggles, face screens, face shields, visors.



Head and neck:

Hazards: impact from falling or flying objects
 risk of head bumping, hair getting tangled in machinery
 chemical drips or splash, climate or temperature.

Options: industrial safety helmets, bump caps, hairnets and firefighters helmets.

Ears :-

Hazards:- a combination of sound level and duration of exposure, a very high-level sounds are a hazard even with short duration.

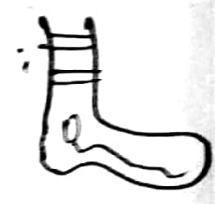
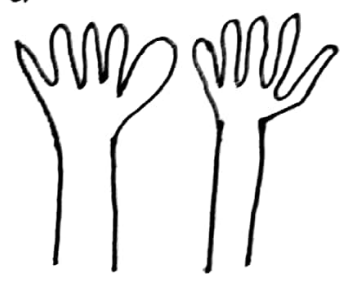
Options :- Earplugs, earmuffs, semi-insert / canal caps



Hands and arms :-

Hazards: Abrasion, temperature extremes, cuts and punctures, impact, chemicals, electric shock, radiation vibration, biological agents and prolonged immersion in water.

Options :- Gloves, gloves with cuff, gauntlets and sleeving that covers part or all of the arm.



Feet and legs :-

Hazards:- wet, hot and cold conditions, electrostatic buildup, slipping, cuts and punctures, falling objects, heavy loads, metal and chemical splash, vehicles.

Options :- safety boots.

Lungs:-

hazard : oxygen-deficient atmospheres, dust gases and vapours.

Options : RPE (Respiratory protective equipment)



whole body:-

Hazards:- heat, chemical or metal splash, spray from pressure leaker or spray guns, contaminated dust, impact or penetration, excessive wear or entanglement of own clothing.

Options :- boiler suits, aprons, chemical suits.

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