

Internal Assessment Test 2 – December 2021

Sub:	Environmental Protection and Management				Sub Code:	18CV753	Branch:	All Branches
Date:	21.12.2021	Duration:	90 min's	Max Marks:	50	Sem / Sec:	VII	

Solutions

1. Explain the environmental quality objectives.

Environmental quality objective (EQO) means a goal, which specifies a desirable target for environmental quality that should be met in some particular environment, such as a river, beach or industrial site.

Environmental objectives are goals, preferably quantified, that are set by an organization to assist in the achievement of continual improvement and prevention of pollution according to commitments made in the environmental policy. When appropriate, an objective should be broken down and allocated to different departments or areas of the organization to assist in achieving the overall objective.

The organizations shall establish and maintain documented environmental objectives and targets at each relevant function and level within the organization. Objectives and targets will be consistent with the environmental policy, including the commitment to prevention of pollution. When establishing and reviewing its objectives and targets an organization shall consider:

- Legal and other requirements
- Significant environmental aspects
- Technological options
- Financial, operating, and business requirements
- Views of interested parties.

According to the United Nations, they have a list of global environmental quality objectives as described below

1. Reduced Climate Impact

The UN Framework Convention on Climate Change provides for the stabilization of concentrations of greenhouse gases in the atmosphere at levels which ensure that human activities do not have a harmful impact on the climate system. This goal must be achieved in such a way and at such a pace that biological diversity is preserved, food production is assured, and other goals of sustainable development are not jeopardized. Sweden, together with other countries, must assume responsibility for achieving this global objective.

2. Clean Air

The air must be clean enough not to represent a risk to health or to animals, plants or cultural assets.

3. Natural Acidification Only

The acidifying effects of deposition and land use must not exceed the limits that can be tolerated by soil and water. In addition, deposition of acidifying substances must not increase the rate of corrosion of technical materials or cultural artefacts and buildings.

4. A Non-Toxic Environment

The environment must be free from man-made or extracted compounds and metals that represent a threat to human health or biological diversity.

5. A Protective Ozone Layer

The ozone layer must be replenished so as to provide long-term protection against harmful UV radiation.

6. A Safe Radiation Environment

Human health and biological diversity must be protected against the harmful effects of radiation in the external environment.

7. Zero Eutrophication

Nutrient levels in soil and water must not be such that they adversely affect human health, the conditions for biological diversity or the possibility of varied use of land and water use.

8. Flourishing Lakes and Streams

Lakes and watercourses must be ecologically sustainable, and their variety of habitats must be preserved. Natural productive capacity, biological diversity, cultural heritage assets and the ecological and water-conserving function of the landscape must be preserved, at the same time as recreational assets are safeguarded

9. Good-Quality Groundwater

Groundwater must provide a safe and sustainable supply of drinking water and contribute to viable habitats for flora and fauna in lakes and watercourses.

10. A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos

The North Sea and the Baltic Sea must have a sustainable productive capacity, and biological diversity must be preserved. Coasts and archipelagos must be characterized by a high degree of biological diversity and a wealth of recreational, natural and cultural assets. Industry, recreation and other utilization of the seas, coasts and archipelagos must be compatible with the promotion of sustainable development. Particularly valuable areas must be protected against encroachment and other disturbance.

11. Thriving Wetlands

The ecological and water-conserving function of wetlands in the landscape must be maintained and valuable wetlands preserved for the future.

12. Sustainable Forests

The value of forests and forest land for biological production must be protected, at the same time as biological diversity and cultural heritage and recreational assets are safeguarded.

13. A Varied Agricultural Landscape

The value of the farmed landscape and agricultural land for biological production and food production must be protected, at the same time as biological diversity and cultural heritage assets are preserved and strengthened.

14. A Magnificent Mountain Landscape

The pristine character of the mountain environment must be largely preserved, in terms of biological diversity, recreational value, and natural and cultural assets. Activities in mountain areas must respect these values and assets, with a view to promoting sustainable development. Particularly valuable areas must be protected from encroachment and other disturbance.

15. A Good Built Environment

Cities, towns, and other built-up areas must provide a good, healthy living environment and contribute to a good regional and global environment. Natural and cultural assets must be protected and developed. Buildings and amenities must be located and designed in accordance with sound environmental principles and in such a way as to promote sustainable management of land, water and other resources.

2. Detail the purpose and objective of environmental performance indicators.

Purpose

1. Environmental performance indicators provide information that helps evaluation and decision making within organizations that engage in environmental efforts.
2. Environmental performance indicators provide a common foundation of information for organizations and external interested parties (such as consumers, business partners, residents

in local communities, shareholders, and financial institutions) and it helps interest parties' proper understanding of activities of the organizations and their environmental efforts.

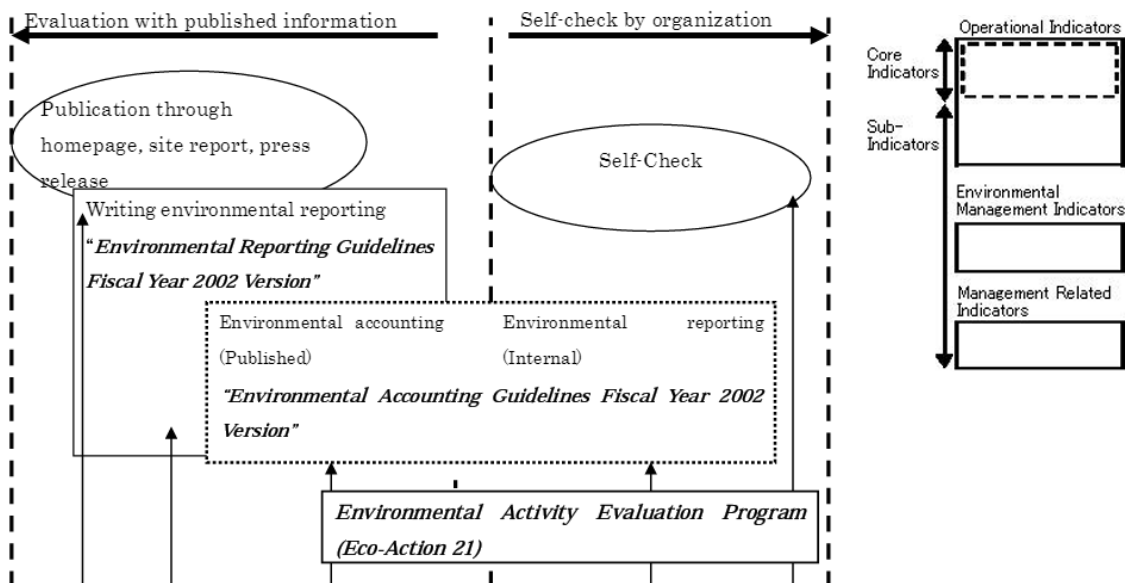
3. Environmental performance indicators provide a common foundation of information that helps the integration of environmental policies of the national and local governments, such as basic environment plans, and environmental activities of organizations

Objectives

1. The first objective of environmental performance indicators is to measure and evaluate environmental burdens, environmental problems that need to be solved and outcomes of environmental efforts comprehensively in order to promote environmental activities of organizations and to obtain information that helps decision making regarding these activities.
2. The second objective is to provide a common foundation of information between an organization and interested parties in order to facilitate that interested parties, such as consumers, business partners, residents in local communities, shareholders, and financial institutions, understand environmental activities of the organization. Organizations have significant impacts on the environment through their business activities. As the necessity of building a sustainable society rises, organizations have the responsibility of disclosing what environmental burdens they cause, what activities they implement to reducing these environmental burdens, and what environmental efforts they exercise. For external interested parties, environmental information has become necessary for their evaluation and choice of organizations. Environmental performance indicators could be used as environmental information in environmental reporting.
3. The third objective is to provide a common foundation of information for macro-level environmental policies of the national and local governments.

External interested parties have a few methods to evaluate environmental efforts of organizations. However, there has not been a standard method yet. Furthermore, no definition of information, method of calculation, the boundary of information gathering, units and so on have been standardized. When an organization or external interested party evaluate environmental efforts, it is important to understand the background of business activities of the organization that causes environmental burden, yearly changes of the environmental burden, and environmental efforts using these performance guidelines. These guidelines do not intend to evaluate organizations with quantitative values of environmental performance indicators alone.

- All the environmental performance indicators need to satisfy the following requirements.
 1. Relevance
 2. Comparability
 3. Verifiability
 4. Comprehensiveness
 5. Clarity
- Evaluation by Environmental Performance Indicators
 1. Time-Series Comparative Evaluation
 2. Comparative Evaluation with the Baseline
- Framework of the Environmental Performance Indicators
 - Operational Indicators
 - Environmental Management Indicators
 - Management Related Indicators



Relation with environmental performance indicators

3. Give stream classifications. Explain how stream standards influence stream classifications.

A designated best use classification of streams was evolved by the Central pollution control board in its report entitled Scheme for Zoning and Classification of Indian Rivers, Estuaries and Coastal Waters (ADSORBS/3/1978/-79).

The central pollution control board classified the inland surface waters into five categories (A to E) on the basis of designated-best-use. The principal concern here is the end use to which the water may be put to by man. The classification has been made in such a way that the water quality requirement becomes progressively lower from A to E. Besides, the water quality of any one of the five categories also satisfies the requirements of categories lower than the chosen one. An area or stretch of a body may be subjected to a number of uses. The area or the stretch is designated by that particular use which demands the highest/purest quality is the best possible way the Designated-best-use can be defined. The existing quality status is not the guiding factor. The quality-based use of this stretch of the river may belong to a lower category (ADSORBS/4/1980-81). The limits of tolerance adopted by the Indian Standards Institution (1982) for the five categories were in a slightly modified form of the Central Board's parameters. The system of classification based on designated-best-use for fresh and saline waters are quoted below (ADSORBS/2/1980-84,/4/1980-81 AND/7/1983-84).

FRESH WATERS

Designated best uses	Classifications
Drinking water source without conventional treatment but after disinfection	A
Outdoor bathing, swimming and water contact sports.	B
Drinking water source with conventional treatment followed by disinfection	C
Propagation of wild life and fisheries.	D
Irrigation, industrial cooling and controlled waste disposal	E

PRIMARY WATER QUALITY CRITERIA

Designated Best Use	Class of Water	Criteria
<p>Drinking Water source without conventional treatment but after disinfection</p>	<p>A</p>	<ol style="list-style-type: none"> 1. Total coliform organisms MPN/100 ml shall be 50 or less. Note : If MPN count is noticed to be more than fifty then regular Tests should be carried out. The criteria would be satisfied if during a period of time not 1 more than 5% of the samples show greater than 200 MPN/ 100 ml and not more than 20% of samples show more than 50 MPN/ 100 ml. 2. pH: between 6.5 and 8.5 3. Dissolved Oxygen 6 mg/1 or more. 4. Biochemical Oxygen Demand (5-day at 20⁰C):2 mg/1 or less. <p>Note : There shall be no visible discharge of domestic and industrial wastes into class A.</p>
<p>Outdoor bathing, (Organized)</p>	<p>B</p>	<ol style="list-style-type: none"> 1. Total coliform organisms (MPN/100 ml shall be 500 or less. Note : If MPN count is noticed to be more than 500 MPN/100 ml then regular tests should be carried out. The criteria would be satisfied if during a period of time not more than 5% of the samples show greater than 2000 MPN/100 ml and not more than 20% of samples show greater than 500 MPN/100 ml 2. pH: between 6.5 and 8.5 3. Dissolved Oxygen: 5 mg/1 or more. 4. Biochemical Oxygen Demand (5-day at 20⁰C):3 mg/1 or less. 5. Note : All domestic and industrial wastewater discharge upstream of bathing places shall be so regulated that the stream standards are maintained and that there is no visible floating matter including oils at the bathing places.
<p>Drinking water source</p>	<p>C</p>	<ol style="list-style-type: none"> 1. Total coliform organisms (MPN/100 ml shall be 5000 or less.

		<p>Note : If MPN count is noticed to be more than 5000 MPN/100 ml then regular tests should be carried out. The criteria would be satisfied if during a period of time not more than 5% of the samples show greater than 20,000 MPN/100 ml and not more than 20% of samples show greater than 5000 MPN/100 ml</p> <ol style="list-style-type: none"> 2. pH: between 6 and 9 3. Dissolved Oxygen: 4 mg/l or more. 4. Biochemical Oxygen Demand (5-day at 20⁰C):3 mg/l or less. 5. Note : All domestic and industrial wastewater discharge into Class C waters shall necessarily be treated to ensure maintenance of stream standards are and the discharge points shall be kept sufficiently away form the abstraction points.
Propagation of wild life, fisheries	D	<ol style="list-style-type: none"> 1. pH: between 6.5 and 8.5 2. Dissolved oxygen: 4mg/1 or more. 3. Free Amunonia (as N): 1.2 mg/1 or less
Irrigation, industrial cooling and controlled waste	E	<ol style="list-style-type: none"> 1. pH: between 6.0 to 8.5 2. Electrical conductivity at 20⁰C/nho/cm:Max 2250 3. Sodium Absorption Ratio : Max 26. 4. Boron : Max 2 mg/1.

4. Define bench marking and explain the three distinctive types of benchmarking.

Benchmarking is the process of improving performance by identifying, understanding, adapting and implementing best practices and processes that are found inside and outside a company. It involves the creation of partnerships to exchange information on processes and measurements, resulting in the setting of realistic improvement goals. Effective benchmarking is a process of continuous improvement.

Benchmarking is a framework within which performance indicators and the best practices are examined in order to determine areas where the company performance can be improved. Although most benchmarking initiatives concern financial and management issues, environmental benchmarking is becoming a major element in the environmental management of companies.

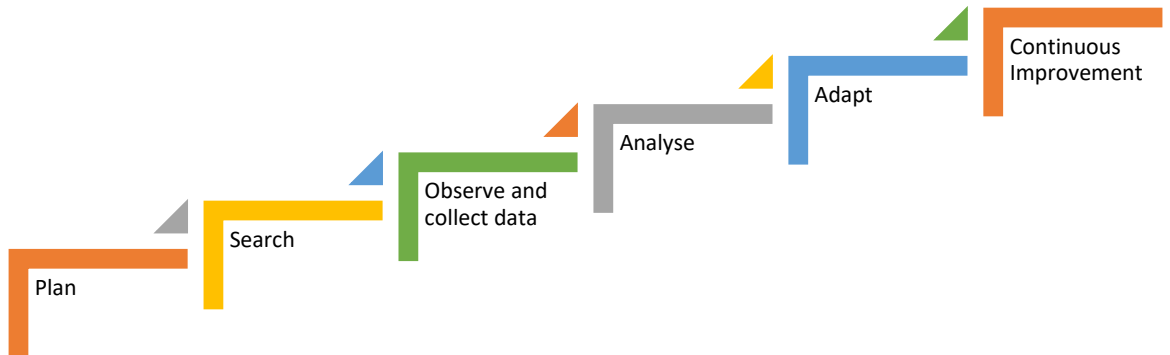
Environmental benchmarking is an environmental management tool that can provide a substantial contribution to the improvement of environmental performances by facilitating the identification of the gap between company performance and an optimal performance. It helps the company's management to find out how to continuously and exactly monitor the development of the company's environmental impacts in the chosen sector and to find relationships between the environment, the economy and society and to transform them into Key Performance Indicators (KPIs) for the measurement of environmental performance.

The scope of environmental benchmarking should include all areas of the given company's activities, and not be restricted solely to those activities that have an obvious environmental impact. Therefore, it may include an assessment of Environmental Management Systems (EMS), management performance, Environmental Management Accounting (EMA), resource and waste management, product environmental quality, environmental education and training, customer relations and emergency response.

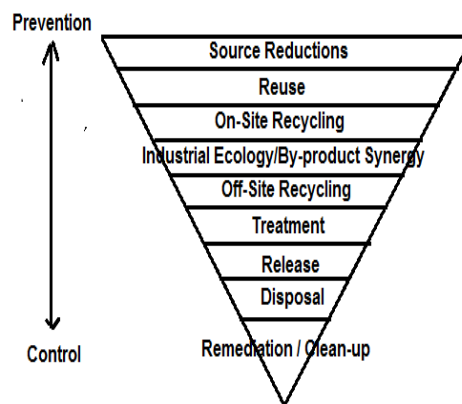
Benchmarking Systems

The benchmarking process is a series of actions, steps, functions, or activities that bring about an end or a result: the identification and importance of best practices for the improvement of EP. There are dozens of sources which describe the benchmarking process. It is called by some “the nine-step benchmarking process”

Benchmarking is wheel on process/continuous process



5. With a neat sketch of pollution prevention hierarchy, explain pollution prevention techniques?



Pollution prevention is generally defined as “the use of processes, practices, materials, products or energy that avoids or minimizes the creation of pollutants or wastes at the source.

Pollution prevention techniques and practices focus on, Substances of concern, Materials and feedstock substitution, Operating efficiencies, On-site reuse and recycling, Training, Purchasing practices, Product design, Equipment modifications, Product reformulation, Process changes, Clean production, Avoidance of cross-media transfer of pollutants or waste, Life-cycle assessment.

Pollution prevention techniques:

1) Materials and feedstock substitution is a method of source elimination.

- Polluting materials in a production process or embedded in a product are replaced with less polluting or nonpolluting substances
- Opportunities for materials and feedstock substitution include:

Painting applications, Parts cleaning, Metal finishing, printing operations, Building and grounds maintenance.

2) Operating efficiencies and training are examples of how normal parts of good operation can provide effective ways to prevent pollution.

Examples include, changing production schedules to minimize equipment and feedstock change overs, improving maintenance schedules, segregating by-products at the source, Training staff to improve material handling and recognize opportunities.

3) Product design and reformulation includes methods for preventing pollution associated with the entire life cycle.

Addressing environmental concerns at an early stage can avoid environmental impacts throughout the product life cycle in a cost-effective manner.

Results of redesigning or reformulating a product include, reducing toxicity of a product, reducing waste material, Extending the life of a product, Extending the life of the materials used, Reducing energy and material intensity needed to produce, use and dispose of the product.

4) Equipment modifications and process changes involve new technologies or approaches to existing operating systems processes and practices to improve production efficiencies and reduce pollution and waste. An example is mechanical stripping instead of using solvents to remove paint and varnish

5) The Value of Waste

Waste can also be viewed as a loss of valuable process materials that could have economic and environmental benefits if reused or recycled.

6. Describe the core element of EMS, with a schematic diagram.

The Key components are

1. Environmental Policy

- a. Reflects how the organization feels about the environment
- b. Identifies environmental impacts of processes and products
- c. Ensures compliance with environmental requirements
- d. Commits organization to prevent pollution, reduce environmental risks and share information with external stakeholders

2. Environmental Requirements and Voluntary Initiatives

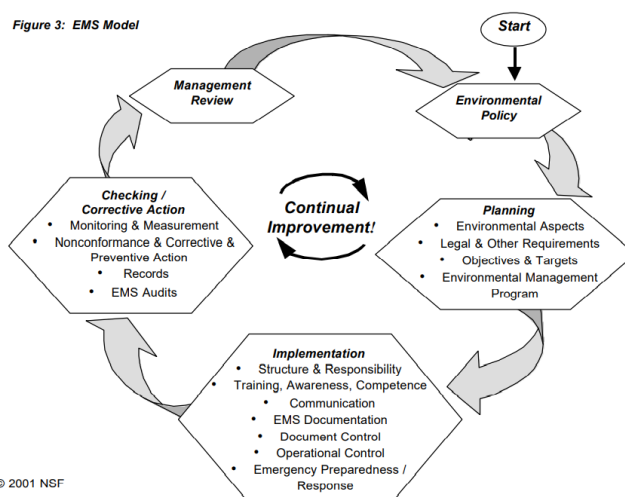
- a. Employees understand their roles in meeting environmental requirements
- b. Identify management and manufacturing practices that affect the organization's ability to meet requirements
- c. Identify and work with programs that encourage preventing pollution

3. Objectives/Targets

- a. Set the following environmental objectives: comply with environmental requirements; continuous improvement in regulated and non-regulated areas; prevent pollution
- b. Make objectives specific to the organization
- c. Set timeframes to meet objectives

- d. Update objectives as environmental requirements evolve
- 4. Structure, Responsibility and Resources**
 - a. Ensure the organization has the personnel and resources needed to meet objectives
 - b. Make managers responsible for the environmental performance of their unit
 - c. Develop procedures for attaining objectives
- 5. Operational Control**
 - a. Establish a procedure to ensure the proper waste management hierarchy is followed
 - b. Develop simple procedures to measure and report environmental impacts of processes and products
- 6. Corrective and Preventive Action and Emergency Procedures**
 - a. Document procedures for identifying, correcting and preventing mistakes
 - b. Develop emergency procedures to minimize or eliminate adverse environmental impacts associated with accidents or emergencies
 - c. Correct causes of potential hazards to prevent pollution
- 7. Training, Awareness and Competence**
 - a. Train staff whose roles affect meeting objectives, and make certain staff are duties
 - b. Mandatory trainings include detailed pollution prevention methods
- 8. Organizational Decision-making and Planning**
 - a. Use life cycle analysis to identify the impact products make on the environment
 - b. Empower all employees to make pollution prevention improvements that do not require significant resources
- 9. Document Control**
 - a. For future evaluation, document steps taken to meet objectives
 - b. Use electronic documentation to improve record management
 - c. Document all pollution prevention suggestions
- 10. Continuous Evaluation and Improvement**
 - a. Conduct and document periodic objective based audits of the organization's performance
 - b. Use audits to assess pollution prevention efforts

Figure 3: EMS Model



Key Elements of an EMS: A Snapshot

- **Environmental policy** — Develop a statement of your organization's commitment to the environment. Use this policy as a framework for planning and action.
- **Environmental aspects** — Identify environmental attributes of your products, activities and services. Determine those that could have significant impacts on the environment.
- **Legal and other requirements** — Identify and ensure access to relevant laws and regulations, as well as other requirements to which your organization adheres.
- **Objectives and targets** — Establish environmental goals for your organization, in line with your policy, environmental impacts, the views of interested parties and other factors.
- **Environmental management program** — Plan actions necessary to achieve your objectives and targets.
- **Structure and responsibility** — Establish roles and responsibilities for environmental management and provide appropriate resources.
- **Training, awareness and competence** — Ensure that your employees are trained and capable of carrying out their environmental responsibilities.
- **Communication** — Establish processes for internal and external communications on environmental management issues.
- **EMS documentation** — Maintain information on your EMS and related documents.
- **Document control** — Ensure effective management of procedures and other system documents.
- **Operational control** — Identify, plan and manage your operations and activities in line with your policy, objectives and targets.
- **Emergency preparedness and response** — Identify potential emergencies and develop procedures for preventing and responding to them.
- **Monitoring and measurement** — Monitor key activities and track performance. Conduct periodic assessments of compliance with legal requirements.
- **Nonconformance and corrective and preventive action** — Identify and correct problems and prevent their recurrence.
- **Records** — Maintain and manage records of EMS performance.
- **EMS audit** — Periodically verify that your EMS is operating as intended.
- **Management review** — Periodically review your EMS with an eye to continual improvement.

7. What is continual improvement in environmental performance? How can it be planned in an organization?

It is the "Process of enhancing the environmental management system to achieve improvements in overall environmental performance in line with the organization's environmental policy." The term *continual improvement* is used to identify the need to systematically improve different processes within the EMS in order to provide improvements overall. It is unreasonable to expect that every process within the EMS will be improving all the time, so continual improvement is used to plan, monitor, and realize improvement in some processes that have been identified for improvement.

While there are many ways that continual improvement can be planned within an EMS, two of the main processes identified in the requirements of ISO 14001 are **the use of environmental objectives and risk-based thinking**. Through the proper use of these two processes, you can see great benefits from continual improvement in your EMS.