

Energy and Environment Engineering

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ENVIRONMENT AND ECOSYSTEMS

Introduction: Concept of an ecosystem- structure and functions of ecosystem. Components of ecosystem - producers, consumers, decomposers, Food chains, food webs, ecological pyramids, Energy flow in ecosystem. Bio-geo- chemical cycles, Hydrologic cycle Components of Environment and their relationship, Impact of technology on environment, Environmental degradation. Environmental planning of urban network services such as water supply, sewerage, solid waste management.

ENVIRONMENTAL POLLUTION

Water, air, soil, noise, thermal and radioactive, marine pollution: sources, effects and engineering control strategies. Drinking water quality and standards, Ambient air and noise quality standards

GLOBAL ENVIRONMENTAL ISSUES AND ITS MANAGEMENT

Engineering aspects of climate change. Acid rain, depletion of ozone layer. Concept of carbon credit. Concepts of Environmental impact assessment and Environmental audit. Environmental life cycle assessment

Environmental Audit/ Statement

Environmental Audit/ Statement

Key objectives of an environmental audit include compliance verification, problem identification, environmental impact measurement, environmental performance measurement, conforming effectiveness of EMS, providing a database for corrective actions and future actions, developing company's environmental strategy, communication and formulating environmental policy.

Definition:

Environmental Auditing is a management tool comprising of a systematic, documented, periodic and objective evaluation of how well the Environmental Management Systems (EMS) are performing.

History of Audit

The MoEF, Government of India (GoI) issued Notification on 'Environmental Statements' (ES) in April, 1992 and further amended in April 1993 –

As per the Notification, the industries are required to submit environmental statements to the respective State Pollution Control Boards (SPCBs). ES is a pro-active tool for self examination of the industry to reduce/minimize pollution by adopting process modifications, recycling and reusing of the resources. The regular submission of ES will indicate the systematic improvement in environmental pollution control being achieved by the industry. In other way, specific points in ES may be used as environmental performance indicators for relative comparison, implementation and to promote better practices

The Environment Audit is undertaken voluntarily in various countries such as UK, USA, Canada etc. In India, in most of the states, it is mandatory.

Primary Benefits of Environmental Audit :

- (1) Environmental Audit assesses compliance with the regulations.
- (2) It gives an opportunity for comprehensive review of environmental policies, management systems, organizations and practice.
- (3) It promotes sustainable development.
- (4) It indicates and gives the adequacy and efficacy of the environmental management system (EMS) of an industry.

Additional Benefits of Environmental Audit:

- (1) Increasing awareness of Environmental policies and responsibilities.
- (2) Identify potential cost savings from waste recovery, recycling and minimization.
- (3) Promoting an up to date environmental data base, which may be drawn on, when making decisions on plant modifications or expansion.
- (4) Organizing training programmes and providing information for upgrading the skills of employees.
- (5) Increases the market value and customer satisfaction for good environmental performance.

Environmental Audit Team:

Each team of Environment Audit shall comprise of at least following four persons:

1. Environmental Engineer
2. Chemical Engineer
3. Chemist / Chemical Technologist
4. Microbiologist / Env Science

Environmental Audit Procedure:

There are three phases of an Environmental Audit to be taken up for an industry:

- (1) Pre-Audit activities
- (2) Activities at site
- (3) Post audit activities

Environmental Audit Procedure:

(1) Pre-Audit activities:

- Pre-audit activity serves to collect background information on industry. This is carried out by preparing a questionnaire and interview with concerned persons of the industry.
- Information on industry include products manufactured, raw materials used, quantification of water usage, waste water generation, gaseous emission, solid waste generation, hazardous waste generation.
- The management's environmental policies are brought to the notice of Environmental Auditors.
- Collect the all the material (Equipment's, chemicals, etc) required for audit work

Environmental Audit Procedure:

(2) Activities at site:

- After receiving the necessary information from the industry, the recognized and organized audit team is mobilized at the site and interact with the Industry representative.
- Processes at various unit operation levels and the subsequent pollution control methodologies are studied and understood.
- The data collection for each facility, which is directly or indirectly related with discharge or emission from the industry, is carried out.
- The sampling of all necessary environmental components of industry is **carried out thrice in one year i.e. summer, monsoon and winter.**
- The components to be monitored are stack emission (both process and combustion), effluent discharge, solid waste, hazardous waste, noise and ambient air monitoring.
- After completion of work interact with the Industry representative and signed the all necessary documents.

Environmental Audit Procedure:

(3) Post-Audit activities:

- Post audit activity includes synthesis of whole data of the industry i.e. general information, raw materials consumption, water and electricity consumption and results of environmental monitoring.
- This Environmental Audit report also includes compliances of the industry with respect to Water Act-1974, Air Act-1981, Environment (Protection) Act-1986 and Hazardous Waste Rules-2016.
- There is also provision at the end of the report about certification of the adequacy and efficacy of the EMS of the industry.

Other Import information related to Audit Report

Five (5) copies of the Environmental Audit reports are prepared with signatures of different persons of both party i.e. Environmental Auditors and Industry.

3 copies submitted to GPCB

1 copy with industry

1 copy with Environmental Auditor

- If any industry does not submit its periodical Audit report as per the time schedule (by 30th June every year), GPCB shall stop all manufacturing and processing activities of that industry.
- Also, the GPCB shall intimate the particulars of such defaulting units, including address and electricity meter number to the GIDC / GEB / AEC within two weeks, to disconnect the supply of water and electricity.

Information to be covered in Environmental Audit Report :

1. General Information
2. Product Details
3. Water
4. Air
5. Hazardous (Solid) Waste
6. Site Plan
7. Resource Recovery
8. Health
9. Accidents
10. Safety Measures
11. Noise
12. Odour
13. Cases / complaints
14. Compliance
15. Hazardous Chemicals
16. PLI (Public Liability Insurance)
17. Water Cess
18. Consultant
19. Signatures

Information to be covered in Environmental Audit Report :

General Information:

Name and address of the owner of industry, other general information like phone nos, fax nos.

Product Details:

Manufacturing process and consumption of raw materials.

Water:

Quantity of water consumed and quantity of waste water generated. Details of ETP (Effluent Treatment Plant), quality of effluent, method of disposal of effluent etc.

Air:

Details of flue gas stacks, stack monitoring facilities, air pollution control measures, quality of air emission and ambient air.

Hazardous (Solid) Waste:

Quantity, sources and composition, storage, treatment and disposal methods, treatment of leachate.

Site Plan:

Details of location of ETP, sampling points etc.

Resource Recovery:

Cost aspects of pollution control facilities, reduced cost of production due to conservation of natural resources, use of clean production technology.

Health:

Hazards in the process or work environment, details of pre-employment and periodical examination.

Accidents:

Details of accidents and remedial measures.

Safety Measures:

General environment of the industry, details of personal protective equipments (PPEs), details of disaster management facilities, on-site / off-site emergency plans.

Noise:

Sources, monitoring and measures.

Odour:

Measures taken for odour control in and around the industrial premises.

Cases / complaints:

Cases / complaints under the Water Act-74, Air Act-81 and EPA-86

Compliance:

Compliance of conditions of NOC / CC-A.

Hazardous Chemicals:

Details of production and handling of hazardous chemicals.

PLI:

Details of Public Liability Insurance (PLI) Act.

Water Cess:

Details about the payment of Water Cess for previous and current year.

Consultant:

Name and address of the Consultant.

Signatures:

Name and signatures of

(i) Recognized persons of the industry / factory

(ii) All the members of the Environmental Audit team.

Thank You