

## **Module -4 Environmental Audit**

- **Environmental management system audits as per ISO 19011**
- **Roles and qualifications of auditors**
- **Environmental performance indicators and their evaluation**
- **Nonconformance – Corrective and preventive actions**
- **Compliance audits**
- **Waste audits and waste minimization planning**
- **Due diligence audit**
- **Environmental statement (form V)**

**Environmental management system audits as per ISO 19011**

An Environmental Management System (EMS) Audit refers to a systematic and documented verification process of objectively obtaining audit evidence to determine whether an organization's EMS conforms to the audit criteria and communicating the results of this process to the client.

The EMS audit criteria include policies, practices, procedures or requirements, such as those covered by ISO 14001 and, if applicable, any additional EMS requirements against which the auditor compares collected audit evidence about the organization's environmental management system.

The objectives of a typical EMS audit include:

- determining conformance of an auditee's EMS with the EMS audit criteria;
- determining whether the auditee's EMS has been properly implemented and maintained;
- identifying areas of potential improvement in the auditee's EMS;
- assessing the ability of the internal management review process to ensure the continuing suitability and effectiveness of the EMS;
- evaluating the EMS of an organization where there is a desire to establish a contractual relationship

## **Principles of Auditing**

### **1. Integrity:** the foundation of professionalism

Auditors and the person managing an audit programme should:

- perform their work with honesty, diligence, and responsibility;
- observe and comply with any applicable legal requirements;
- demonstrate their competence while performing their work;

### **2. Fair presentation:** the obligation to report truthfully and accurately

Audit findings, audit conclusions and audit reports should reflect truthfully and accurately the audit activities. The communication should be truthful, accurate, objective, timely, clear and complete.

### **3. Due professional care:** the application of diligence and judgement in auditing.

Auditors should exercise due care in accordance with the importance of the task they perform and the confidence placed in them by the audit client and other interested parties.

### **4. Confidentiality:** security of information

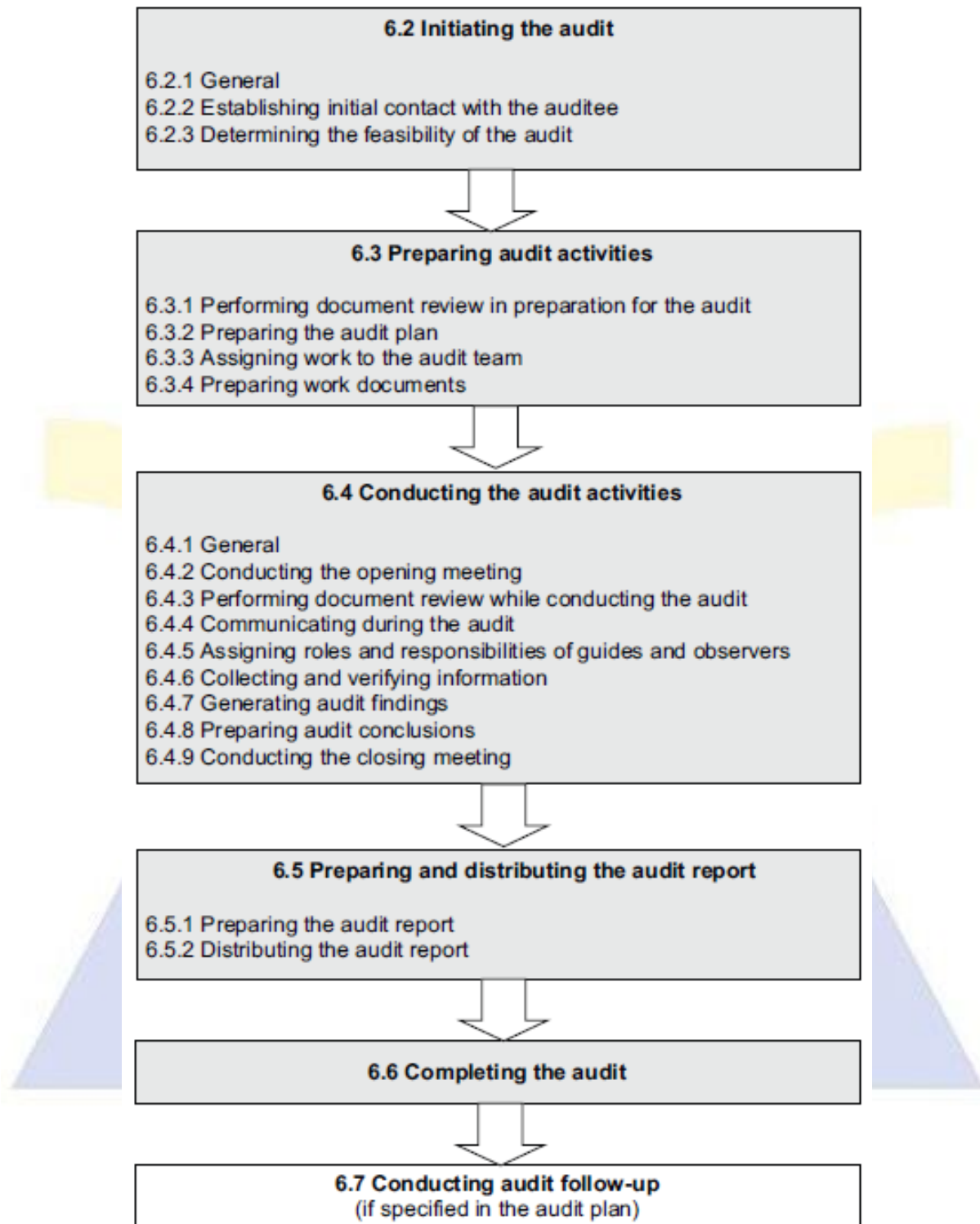
Auditors should exercise discretion in the use and protection of information acquired in the course of their duties

### **5. Independence:** the basis for the impartiality of the audit and objectivity of the audit conclusions.

Auditors should be independent of the activity being audited wherever practicable, and should in all cases act in a manner that is free from bias and conflict of interest

### **6. Evidence-based approach:** the rational method for reaching reliable and reproducible audit conclusions in a systematic audit process.

Audit evidence should be verifiable.

**Environmental Management System (EMS) Audit Process:**

## 1. Initiating the audit

When an audit is initiated, the responsibility for conducting the audit remains with the assigned audit team leader until the audit is completed.

To initiate an audit, the steps in above figure should be considered; however, the sequence can differ depending on the auditee, processes and specific circumstances of the audit.

- a. **Establishing initial contact with the auditee:** The initial contact with the auditee for the performance of the audit can be informal or formal and should be made by the audit team leader.
- b. **Determining the feasibility of the audit:** The feasibility of the audit should be determined to provide reasonable confidence that the audit objectives can be achieved.

## 2. Preparing audit activities

- a. **Performing document review in preparation for the audit:** The relevant management system documentation of the auditee should be reviewed
- b. **Preparing the audit plan:** The audit team leader should prepare an audit plan based on the information contained in the audit programme and in the documentation provided by the auditee
- c. **Assigning work to the audit team:** The audit team leader, in consultation with the audit team, should assign to each team member responsibility for auditing specific processes, activities, functions or locations
- d. **Preparing work documents:** The audit team members should collect and review the information relevant to their audit assignments and prepare work documents, as necessary, for reference and for recording audit evidence

### 3. Conducting the audit activities

- a. **Conducting the opening meeting:** An opening meeting should be held with the auditee's management and, where appropriate, those responsible for the functions or processes to be audited
- b. **Performing document review while conducting the audit**
- c. **Communicating during the audit:** During the audit, it may be necessary to make formal arrangements for communication within the audit team, as well as with the auditee, the audit client and potentially with external bodies
- d. **Assigning roles and responsibilities of guides and observers:** Guides and observers (e.g. regulator or other interested parties) may accompany the audit team
- e. **Collecting and verifying information:** During the audit, information relevant to the audit objectives, scope and criteria, including information relating to interfaces between functions, activities and processes should be collected by means of appropriate sampling and should be verified.
- f. **Generating audit findings:** Audit evidence should be evaluated against the audit criteria in order to determine audit findings.
- g. **Preparing audit conclusions**
- h. **Conducting the closing meeting:** A closing meeting, facilitated by the audit team leader, should be held to present the audit findings and conclusions.

### 4. Preparing and distributing the audit report

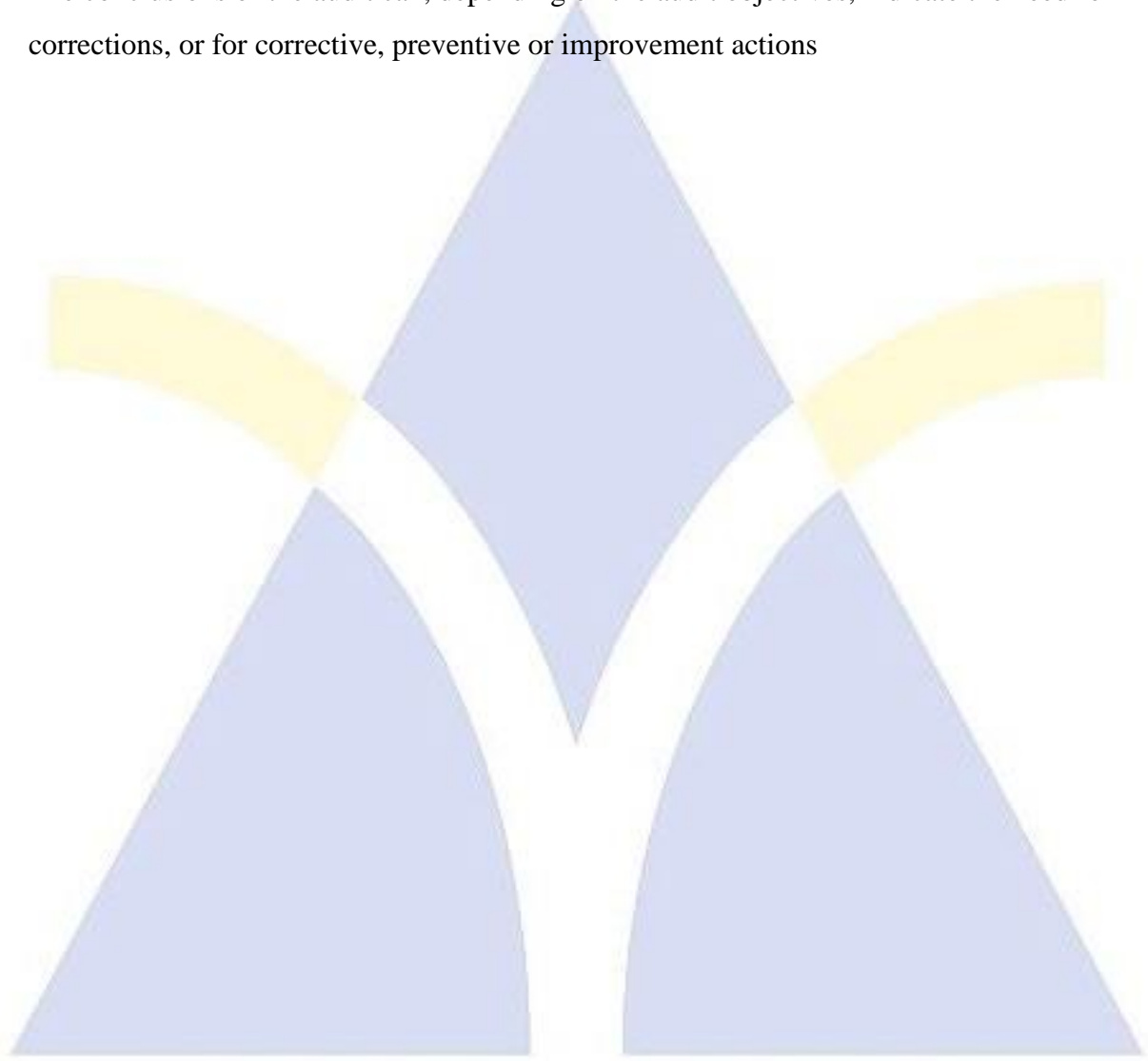
- a. **Preparing the audit report:** The audit team leader should report the audit results in accordance with the audit programme procedures.
- b. **Distributing the audit report:** The audit report should be issued within an agreed period.

## 5. Completing the audit

The audit is completed when all planned audit activities have been carried out, or as otherwise agreed with the audit client

## 6. Conducting audit follow-up

The conclusions of the audit can, depending on the audit objectives, indicate the need for corrections, or for corrective, preventive or improvement actions



**Roles and qualifications of auditors:**

EMS auditors should be trained in auditing techniques and management system concepts. Familiarity with environmental regulations, facility operations, and environmental science is a big plus, and in some cases may be essential to adequately, assess the EMS.

ISO 14012 standard describes recommended EMS auditor qualifications in terms of education, training, and practical experience. In general, an EMS auditor should be familiar with management systems, regulatory and legal requirements, processes and operations involved, and environmental science issues related to the auditee. As a guidance standard, 14012 can only recommend such qualifications, and the key is to ensure the audit team is familiar with the EMS that they are responsible for, and not all other areas of environmental science or regulations. Secondly, it is understood that no single individual may have all of these qualifications, hence the concept of the audit team

**Traits of a good auditor:**

- Independent (activity being audited)
- Impartial
- Tactful
- Attentive to detail
- Objective

**Auditor responsibilities and activities should cover:**

- following the directions of and supporting the lead auditor;
- planning and carrying out the assigned task objectively, effectively and efficiently within the scope of the audit;
- collecting and analyzing relevant and sufficient audit evidence to determine audit findings and reach audit conclusions regarding the EMS;
- preparing working documents under the direction of the lead auditor;
- documenting individual audit findings;
- safeguarding documents pertaining to the audit and returning such documents as required;
- assisting in writing the audit report



## **Environmental Performance Indicators and their evaluation:**

**Environmental Performance Indicators** provide information that helps evaluation and decision making within organizations that engage in environmental efforts.

*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.

*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.

*The third objective* is to provide a common foundation of information for macro-level environmental policies of the national and local governments.

### **Types of environmental performance indicators**

ISO standard describes two general categories of indicators for EPE:

1. Environmental Performance Indicators (EPIs); and
2. Environmental Condition Indicators (ECIs).

There are two types of Environmental Performance Indicators:

- Management Performance Indicators (MPIs) are a type of EPI that provide information about management efforts to influence the environmental performance of the organization's operations. MPIs relate to the policy, people, practices, procedures, decisions and actions at all levels of the organization
- Operational Performance Indicators (OPIs) are a type of EPI that provide information about the environmental performance of the organization's operations.

Environmental Condition Indicators (ECIs) provide information about the condition of the environment. Environmental condition indicators describe the direct strains and impacts on the environment. This information can help an organization to better understand the actual impact or potential impact of its environmental aspects, and thus assist in the planning and implementation of Environmental Performance Evaluation (EPE).

**Environmental Performance Evaluation (EPE)** is “an internal process and management tool designed to provide management with reliable and verifiable information on an ongoing basis to determine whether an organization’s environmental performance is meeting the criteria set by the management of the organization”.

Environmental Performance Evaluation (EPE) is an internal management process that uses indicators to provide information comparing an organization’s past and present environmental performance with its environmental performance criteria. EPE, as detailed in this International Standard, follows a “Plan-Do-Check-Act” management model.

The steps of this ongoing process are the following:

**1. Plan**

- planning EPE;
- selecting indicators for EPE (the process of selecting indicators may include both choosing from existing indicators and developing new indicators).

**2. Do**

Using data and information which includes:

- collecting data relevant to the selected indicators;
- analyzing and converting data into information describing the organization’s environmental performance;
- assessing information describing the organization’s environmental performance in comparison with the organization’s environmental performance criteria;
- reporting and communicating information describing the organization’s environmental performance.

**3. Check and Act: Reviewing and improving EPE.**

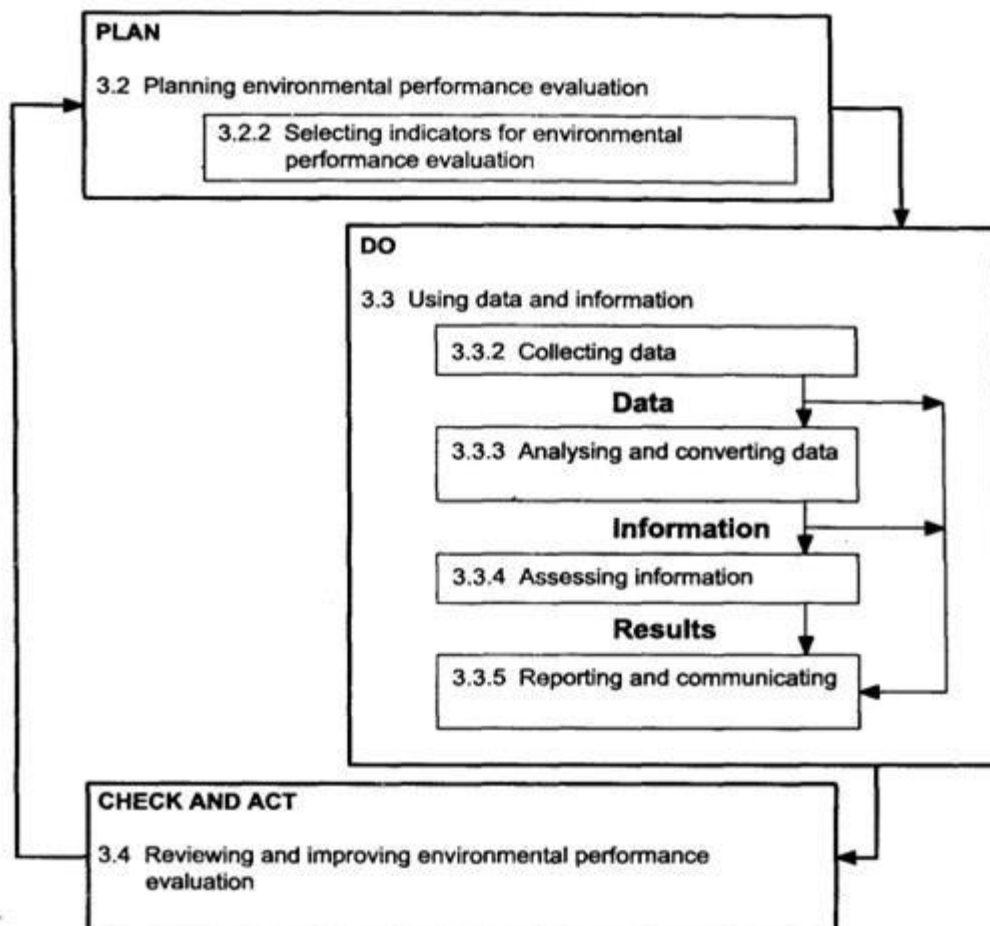


Figure 1 — Environmental performance evaluation

## Nonconformance – Corrective and preventive actions

No EMS is perfect. When system deficiencies are encountered, organization will need a process to ensure that:

- problems including nonconformities are investigated;
- root causes are identified;
- corrective actions are identified and implemented; and,
- corrective actions are tracked and documented.

EMS nonconformities and other system deficiencies should be analyzed to detect patterns or trends. Identifying these trends will allow you to anticipate and prevent future problems.

### EMS problems typically include:

- Poor communication;
- Faulty or missing procedures;
- Equipment malfunction or lack of maintenance;
- Lack of training;
- Lack of understanding of requirements;
- Failure to enforce rules; and
- Corrective actions fail to address root causes of problems.

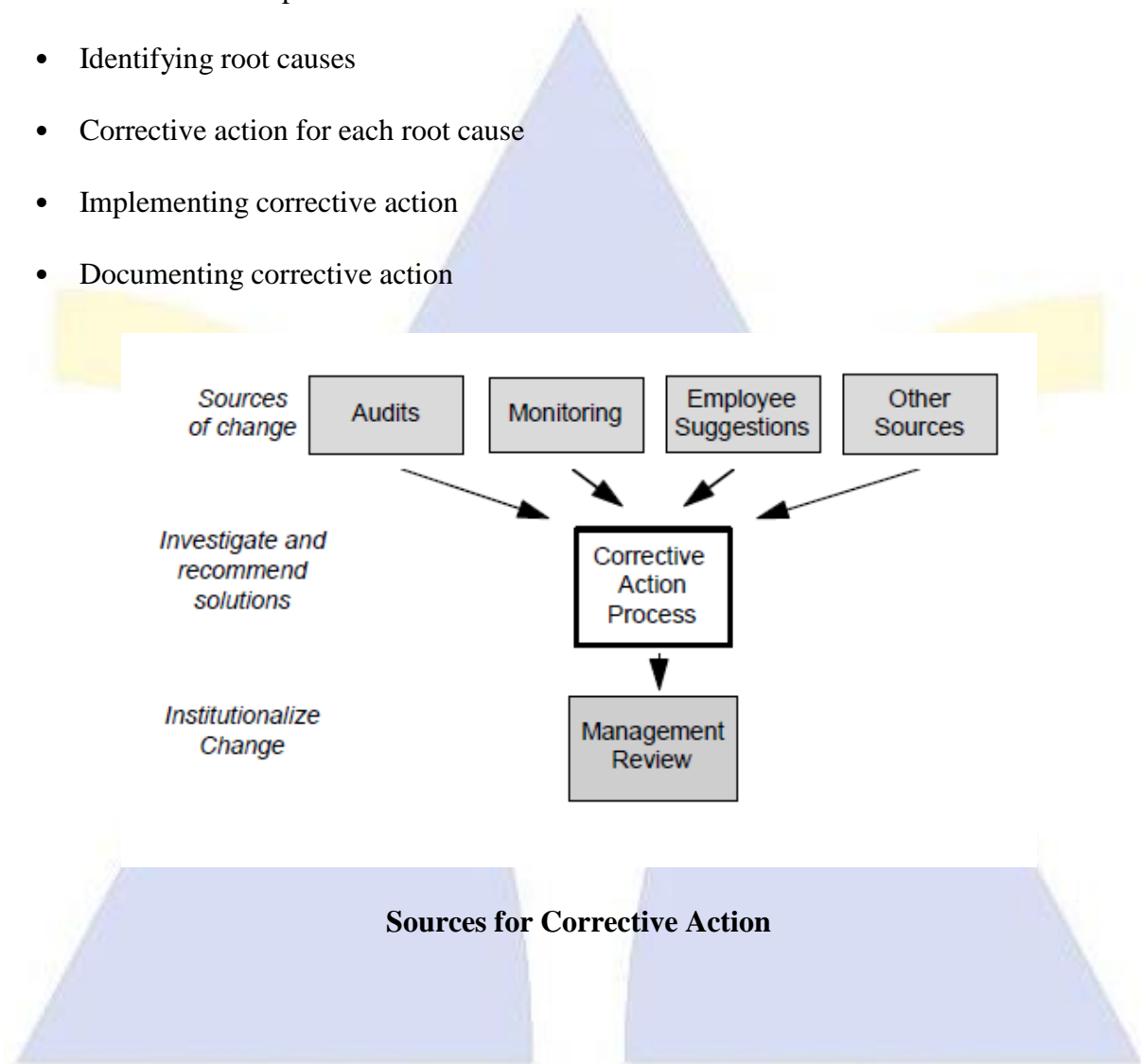
“Root cause analysis” is a process by which you can identify causes and preventive actions.

Example: If a spill occurs several times in your raw material transfer area, you would attempt to identify the root cause of the spill occurring so that you could address the cause and prevent the spill in the future.

Root cause analysis can be used to describe a very formal analysis process, however, it also can mean something simpler, looking past the obvious or immediate reason for a nonconformance to determine why the nonconformance occurred.

The following is a checklist to help complete corrective action

- Identification of problems
- Identifying root causes
- Corrective action for each root cause
- Implementing corrective action
- Documenting corrective action



## Compliance Audits

An Environmental Compliance Audit is an investigation of the compliance status of a facility and/or the extent of environmental liability. This process is a systematic, documented evaluation of a facility, focusing on current operating and administrative procedures and processes.

An environmental compliance audit can also be used to determine whether an existing environmental management system is effectively:

- maintaining compliance
- identifying deficiencies
- taking corrective actions

Environmental compliance audits are thorough inspections and reviews of facilities to ensure a company or site is meeting environmental regulations. With the huge number of ever-changing environmental rules, maintaining compliance can be challenging for any business. Environmental compliance services can help companies not only meet current regulations, but help them prepare for upcoming rules in the future.

An environmental compliance audit may include a review of compliance with local, state or federal rules as well as internal company policies. In addition, if there were any requirements due to previous legal issues, those would be addressed as well. The goal of the regulatory compliance audit is not only to protect the environment, but also to help the company manage risk.

The scope of this type of environmental consulting may vary. A regulatory compliance audit may incorporate all media, including air, soil, water, energy, noise and waste. Or the scope may consist only of an environmental site assessment for one regulated area, such as soil. Each audit is custom designed for an individual facility to ensure environmental regulation compliance specific to that site.

Environmental compliance consulting allows a company to identify and address any existing or potential environmental issues before they become legal issues or lead to regulatory fines and penalties. Educating the company's staff on environmental compliance is also a part of the audit. As a result of the audit, companies often find ways to improve their processes, not only to help the environment, but to save costs too.

Environmental compliance audits focus on a company's operations and systems. A customized, detailed checklist-type protocol is typically used to conduct the audit. Environmental compliance consulting also may include questionnaires, site visits, records reviews, interviews with staff, and comprehensive facility inspections and compliance reviews.

During the post-audit phase, a written report is provided along with other action steps that may include staff review and training. The compliance audit report will not only document how well the company meets environmental regulations, but also address any areas of environmental risk and recommend activities to solve problems and meet new regulations. The entire process is designed to promote environmental compliance solutions.

Conducting a compliance audit not only lowers the risk of violating environmental regulations, but also demonstrates a company's commitment to continually improving the environment.



## Waste Audits and Waste Minimization Planning

A waste audit is a physical analysis of waste composition to provide a detailed understanding of problems, identify potential opportunities, and give you a detailed analysis of your waste composition. A waste audit is a thought-out process that is used to determine the amount and types of waste produced by a company

Organizations conduct waste audits to minimize the organization's waste impact on the environment. Organizations conduct waste audits voluntarily and as mandated by local, state and federal laws. These audits typically cover both public and private buildings in industrial and commercial developments. Successful waste audits help to ensure a safe and healthy environment for the business and everyone in the surrounding area.

A waste audit will help organization to clearly, identify their waste generation to:

- Establish baseline or benchmark data.
- Characterize and quantify waste streams.
- Verify waste pathways.
- Identify waste diversion opportunities.
- Identify source reduction opportunities.
- Assess effectiveness and determine ways to improve efficiency of your current waste management systems.
- Gain specific information for local government accreditation.
- Obtain detailed data on waste generation.

### Process of Waste Audit

A waste audit is a process used to calculate the type and amount of waste generated by an organization. Any size organization can perform this type of audit. The data collected from the audit will identify the type of waste produced by the organization and how the organization manages this waste. The audit can also make the organization more effective at reducing waste management costs by educating staff about proper waste disposal and making better use of natural



resources. When performing a waste audit, the organization should not inform staff about the audit prior to the completion of the audit. Informing staff in advance can alter waste disposal habits resulting in an inaccurate and counterproductive audit.

### Validating the Data

Once the organization receives the data from a waste audit, the organization must validate the data. The company must ensure that the data collected during this process is sample representative. Additionally, the data must consider the organization over time. If the organization had previous waste audits, the organization should compare the data from the present waste audit to the data previously generated. Once the organization successfully validates the data and makes sure the data is representative of the habits of the organization, the organization can take measures to make changes to waste management procedures.

### Implementation

Organizations may choose to implement aspects of the waste audit with the help of different environmental agencies such as the Environmental Protection Agency or various state and local agencies. Environmental agencies have many resources that the organization can use to make the implementation process more effective. Each organization has specific waste management needs, but reduction, collection and recycling are common tools used by organizations during the implementation process.

### Monitoring and Reviewing

In many cases, the initial excitement of performing and implementing these audits does not last long. A monitoring and review process performed weekly, bi-monthly or monthly by the organization can help to ensure the long-term success of changes to waste management policies. Typically, organizations will create a waste team responsible for this monitoring and review process. Additionally, rotating the team members involved in the monitoring and review process will discourage complacency and encourage organization-wide participation in waste management changes

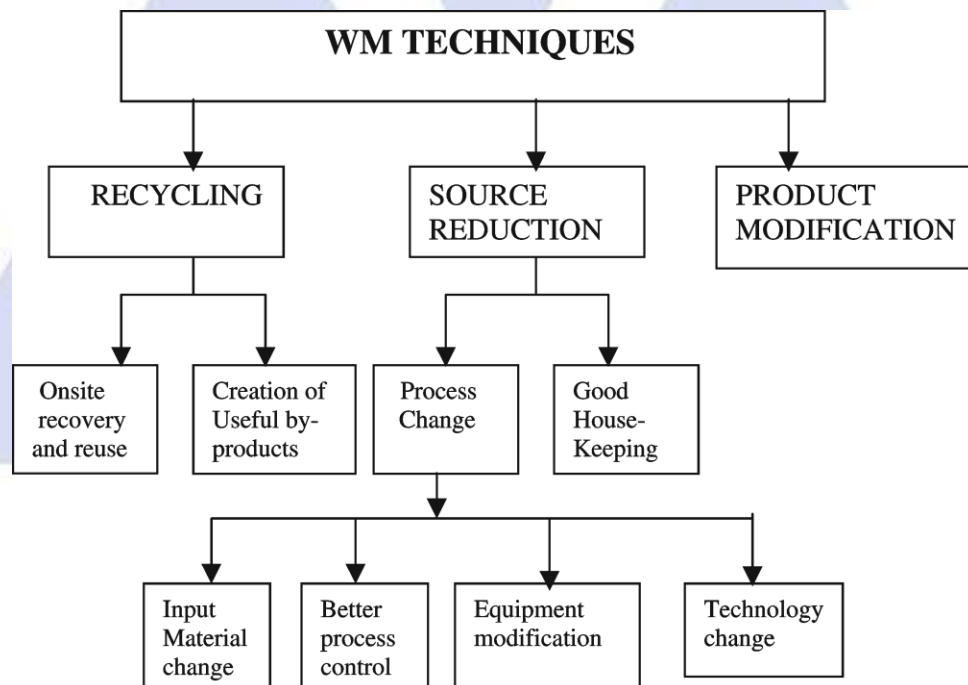
**Waste minimization** can be defined as "systematically reducing waste at source". It means:

- Prevention and/or reduction of waste generated
- Efficient use of raw materials and packaging
- Efficient use of fuel, electricity and water
- Improving the quality of waste generated to facilitate recycling and/or reduce hazard
- Encouraging re-use, recycling and recovery.

Waste minimization is also known by other terms such as waste reduction, pollution prevention, source reduction and cleaner technology. It makes use of managerial and/or technical interventions to make industrial operations inherently pollution free

It should be also clearly understood that waste minimization, however attractive, is not a solution for all environmental problems and may have to be supported by conventional treatment/disposal solutions

The waste minimization is based on different techniques. These techniques are classified as hereunder.



Waste Minimization Planning:

### Recycling

- i) *On-site Recovery and Reuse* - Reuse of wasted materials in the same process or for another useful application within the industry.
- ii) *Production of Useful by-product* - Modification of the waste generation process in order to transform the wasted material into a material that can be reused or recycled for another application within or outside the company.

**Source Reduction:** Under this category, two techniques of WM are:

a) *Good Housekeeping*- Systems to prevent leakages & spillages through preventive maintenance schedules and routine equipment inspections. Also, well-written working instructions, supervision, awareness and regular training of workforce would facilitate good housekeeping.

b) *Process Change:* Under this head, four CP techniques are covered:

- (i) *Input Material Change* - Substitution of input materials by eco-friendly (nontoxic or less toxic than existing and renewable) material preferably having longer service time.
- (ii) *Better Process Control* - Modifications of the working procedures, machine-operating instructions and process record keeping in order to run the processes at higher efficiency and with lower waste generation and emissions.
- (iii) *Equipment Modification* - Modification of existing production equipment and utilities, for instance, by the addition of measuring and controlling devices, in order to run the processes at higher efficiency and lower waste and emission generation rates.
- (iv) *Technology change* - Replacement of the technology, processing sequence and/or synthesis route, in order to minimize waste and emission generation during production.

### Product Modification

Characteristics of the product can be modified to minimize the environmental impacts of its production or those of the product itself during or after its use.

## Due diligence audit

**Environmental Due Diligence (EDD)** is the assessment and management of environmental liabilities and risks. This can take various forms and be accomplished through several methods, but the objective is always the same: to establish that your organization is compliant with environmental regulation and safeguarded against environmental accidents such as soil and/or groundwater contamination.

Environmental Due Diligence is both a legal and technical exercise – an action of analyzing your organization's site or a site your organization is looking to acquire. It is often demonstrated by a formal assessment of the organization and land to identify any existing or previous environmental conditions and/or contaminations and quantify financial and legal risks.

The environmental assessment which is a part of a due diligence process mainly aims at identifying any claims or liabilities generated by environmental degradation, such as potential soil and groundwater contamination resulting from current or historical activities performed on the site which is subject to the transaction process.

Also, another objective of an environmental due diligence (EDD) is the estimation of associated remediation costs, which may affect the closing of the transaction; if such costs are identified, they can serve as an efficient negotiation tool for the parties involved in the transaction and they can ultimately be turned into commercial advantages.

### Typical Problems in Due Diligence Environmental Audits

Even under well-thought-out environmental due diligence audits, problems arise: surprises occur, facts previously thought correct are proven not to be, people forget, and you realize your own limitations. Each acquisition (or divestiture) usually presents a new business situation, unfamiliar technology and practices, different state laws and regulatory practices, and varying levels of sophistication in the other party. Some frequently encountered problems, and possible responses to them, follow.

## ENVIRONMENTAL STATEMENT: FORM 5

Environmental statement is process of self-inspection for improvement in processes and reduction in waste over the last year.

In today's world every industry is optimizing their Sources, equipment's, processes to face increasing competitions are forced to minimize Environmental pollution. There is need of pressure on pollution contributing industries to optimize their production by improving production technologies.

The only mandatory process in Environmental Statement is to fill up the Form V and submit it to Pollution Control Board. If you notice Form V there are fields where industry needs to put their last year's Numbers with Current Years Numbers to identify where they stand.

### Environmental Statement Submission Date

Notification for Environmental Statement form V Published on 28 Apr 1992 by Ministry of Environment and Forest. As per act (Water, Air and Hazardous waste) every industry should submit environmental statement for financial year ending (i.e. 31st Mar) to concerned state pollution control board.

### Information Collected through Environmental Statement Form V



In the environmental statement every industry should to provide information on production, consumption of raw, water, pollutants discharged in environment, solid and hazardous waste with their treatment processes.

Important things to be reported to pollution control board are:

- if that company is reusing its by-products or waste material which results in reduction in consumption of air, water or energy
- production cost
- additional investment proposals for environmental protection i.e. up gradation, improvement in process or new equipment's to reduce environmental pollution.

### **Environmental Statement Form V Filling Process**

There are total Nine Section in Environmental Statement Form V.

#### **Part A**

Basic information about company like name, address, industry category, production capacity and date of last environmental audit submitted.

#### **Part B**

This part is for comparison of water and raw material consumption for this financial year to previous year.

#### **Part C**

This part is to measure pollutants discharged to environment through medium air and water. how much in excess, an industry is releasing the pollutants into the environment.

#### **Part D**

This part to measure hazardous waste from processes and from pollution control facilities

#### **Part E**

This part is to measure solid waste generated by industry. Also details like quantity recycled, sold and disposed

#### **Part F**

Any new practices adopted to reduce hazardous waste.



**Part G**

Impacts of pollution control measures on natural resources and with cost of production.

**Part H**

Additional investment / process / measures to minimization or prevention of pollution.

**Part I**

In this part other information / initiatives to improve quality of environment needs to be given.

Whenever Part C, indicates high variation then Part H (i.e. additional investment proposals for environmental protection including abatement of pollution) should be taken more seriously



[SAMPLE REPORT OF FORM]

**ANNEXURE**

**ENVIRONMENTAL STATEMENT FORM-V**

**(See rule 14)**

*Environmental Statement for the financial year ending with 31<sup>st</sup> March 2016*

**PART-A**

i. Name and address of the owner/  
occupier of the industry operation  
or process. Naveen Kumar Singh, Director In-charge  
Jaypee Cement Corporation Limited,  
Shahabad Cement Plant, Village- Bankur,  
Tal- Chittapur, Dist. - Kalaburagi

ii. Industry category Primary-(*STC Code*) Secondary- (*STC Code*)

iii. Production category.

Sl No	Product	Unit of Measurement	Quantity
1	Cement	Million tons per Annum	2.4 (Installed capacity)
2	Ele Power	MW	60 (Installed capacity)

iv. Year of establishment May 2012

v. Date of the last environmental statement submitted. NA

**PART-B**

*Water and Raw Material Consumption:*

i. Water consumption in m<sup>3</sup>/d

Process: 5710

Cooling: 700

Domestic: 290

Name of Products	Process water consumption per unit of products	
	During the previous financial year 2014 - 2015	During the current financial Year 2015 - 2016
Cement	NA	0.31 m <sup>3</sup> / T
Ele Power	NA	0.141 L/ kWh

ii. Raw material consumption

Name of Raw materials	Name of Products	Consumption of raw material per unit of output	
		During previous financial year 2014 -15	During current financial Year 2015 -16
Clinker	Cement	0.7 T / T	0.73 T / T
Flyash		0.28 T / T	0.24 T / T
Gypsum		0.03T / T	0.03 T / T
Coal	Ele Power	0.0 T / MWh	0.00105 T / kWh

*\* Industry may use codes if disclosing details of raw material would violate contractual obligations, otherwise all industries have to name the raw materials used.*



## PART-C

### **Pollution discharged to environment/unit of output**

(Parameter as specified in the consent issued)

#### (a) Water

Pollutants	Quantity of Pollutants discharged (mass / day)	Quantity of Pollutants discharged (mass / Volume)	Tolerance limit specified by KSPCB (Mass / Vol)	Percentage of variation from prescribed standards with reason
pH	-	7.61	5.5 to 9	All parameters are maintained in tolerance limit specified, as per CFO
Suspended Solids Max	8.27 kg/day	8 mg/l	100 mg / l	
Oil & Grease	-	ND	10	
Temp	-	Nil	Maximum 5°C higher than intake temp	
Dissolved solids (Inorganic)	427 kg/day	413 mg/l	2100 mg / l Max	
Chlorides (As Cl)	59.29 kg/day	51.18 mg/l	1000 mg / l Max	
Dissolved Phosphates (As P)	0.058 kg/day	0.056 mg/l	5 mg / l Max	
Sulphate (As SO <sub>4</sub> )	52.15 kg/day	50.43 mg/l	1000 mg / l Max	

#### (b) Air

Pollutants	Quantity of Pollutants discharged (mass / day)	Quantity of Pollutants discharged (mass / Volume)	Tolerance limit specified by KSPCB (Mass / Vol)	Percentage of variation from prescribed Standards with reason
PM	191 kg/day	17 mg/Nm <sup>3</sup>	50	Maintained as per tolerance limit
SO <sub>2</sub>	618 kg/day	55 mg/Nm <sup>3</sup>	100	
NO <sub>2</sub>	2881 kg/day	257 mg/Nm <sup>3</sup>	800	

**PART-D**  
**HAZARDOUS WASTES**

*(As specified under Hazardous Wastes (Management & Handling Rules, 1989).*

Hazardous Wastes	Total Quantity (kg)	
	During the previous financial year 2014-15	During the current financial Year 2015-16
From Process		
Used oil	NA	600
From Pollution control Facilities	NA	NA

**PART- E**  
**SOLID WASTES:**

Solid Wastes	Total Quantity (kg)	
	During the previous financial year 2014-15	During the current financial Year 2015-16
From Process		
Bottom Ash	NA	13,92,000
Flyash	NA	6,82,08,000
Sludge	NA	10,40,000
From Pollution control Facilities	NA	Bag filters' dust collection is reused in production

**PART - F**

*Please specify the characteristics (in terms of concentration and quantum) of hazardous as well as solid wastes and indicate disposal practice adopted for both these categories of wastes. **Please refer Annexure A** to Form V*

**PART- G**

*Impact of the pollution control measures taken on conservation of natural resources and consequently on the cost of production. **Please refer Annexure B** to Form V*

**PART - H**

*Additional measures/investment proposal for environmental protection including abatement of pollution.*

**PART - I**

**MISCELLANEOUS:**

*Any other particulars in respect of environmental protection and abatement of pollution.*

**Annexure A**  
to Form V

**PART F** (Please specify the characteristics (in terms of concentration and quantum) of hazardous as well as solid wastes and indicate disposal practice adopted for both these categories of wastes.)

1. Following **hazardous waste** from the plant are disposed in safe manner, according recommended practices without any nuisance to environment.

Sl No	Name	Quantity per year	Storage & transport	Disposal method
1	Used Oil	600 kg	Area earmarked, Stored in drums	Consumed in boiler with coal
2	Used lead acid batteries	15 Nos	Ear marked Storage area	Sold back to battery dealer (Authorized)

2. Other **solid wastes** are disposed in scientific manner to maintain clean and hygienic environment inside the plant and colony area.

Sl No	Name	Quantity per year	Storage & transport	Disposal method
1	Bottom Ash	13.92 T	It is collected at boiler and transported pneumatically to Silo	From silo it is pumped by dense phase conveying system for PPC production in cement mill. Surplus quantity is sold to nearby cement plants through bulkers
2	Fly ash	68208 T	It is collected in ESP hoppers and transported pneumatically to Silo	
3	Sludge	1040 T	Stored in landfill	Used as manure in horticulture
4	Metal/ Wood/paper	5.5T/ 18.25 T	Ear marked Storage area	Sold to scrap dealer
5	Garbage	36 T	Dust bins in colony area	Garbage is collected by Notified area Committee.

**Annexure B**  
to Form V

**PART G** (Impact of the pollution control measures taken on conservation of natural resources and consequently on the cost of production.)

Water being very scarce commodity, maximum efforts are made to conserve it. One of the important technology installed in the captive power plant is “Air cooled Condensers” in the place of conventional water cooled condenser. This facilitates our plant to save water loss due to evaporation in the cooling tower. The total investment for Air cooled condenser is ₹ 16 crore.

Due to use of Air Cooled Condenser in power plant there is saving in water consumption to the tune of 5000 m<sup>3</sup>/ day.