UNIT-6 Checking Environmental Performance

Learning Outcomes

By the end of this unit the learner will be able to:

- ✓ Decsribe how to monitor, measure and evaluate the effectiveness of implementation.
- ✓ List the key stages of environmental audit process.

Unit 6

Checking Environmental Performance

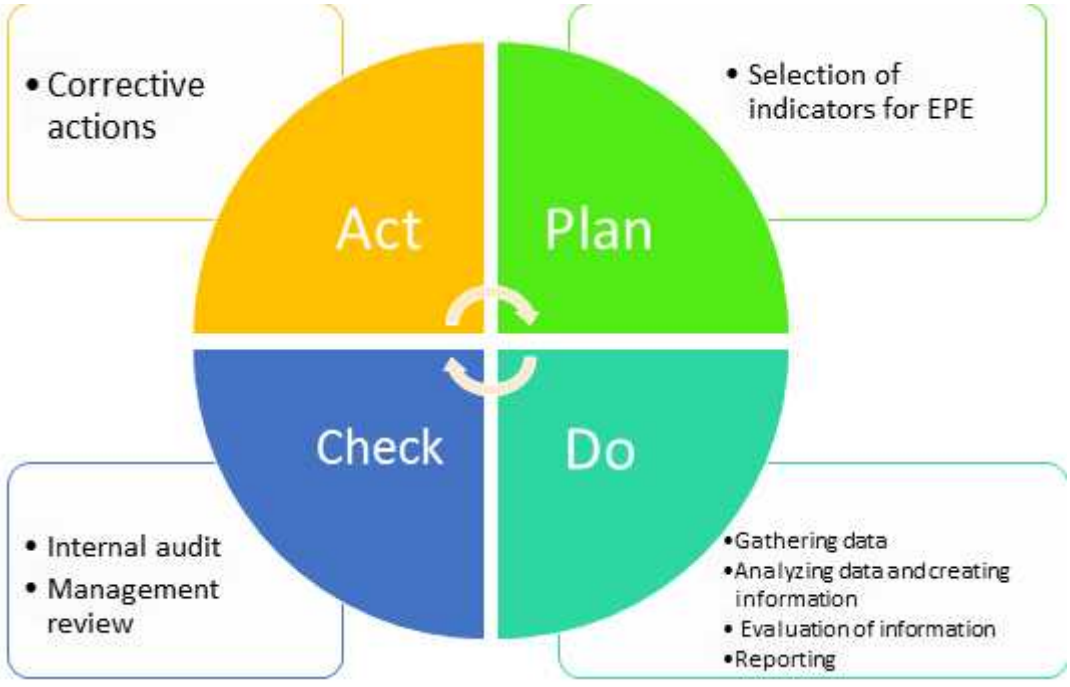
How to Monitor, Measure and Evaluate the Effectiveness of Implementation.

The environmental performance evaluation (EPE) is an internal process and mechanism that should enable continual management of reliable and verifiable information in order to determine whether the environmental management system meets criteria defined by the management of the organization. The EPE uses indicators for gathering the information, and compares current and previous performance with criteria for environmental performance established by the organization itself.

How should we do it?

As in any other situation that requires a systematic approach, you can't go wrong if you apply the Plan-Do-Check-Act cycle

The steps should be taken according to the following figure:



Application of PDCA cycle in environmental performance evaluation

Planning the EPE

If you want your environmental performance evaluation to really work, you must incorporate it into the everyday activities of your organization. The EPE must be based on your significant environmental aspects (see also 4 steps in identification and evaluation of environmental aspects), your own criteria for evaluation of environmental performance, and requirements of the interested parties.

When planning the environmental performance evaluation, you need to take into account the overall spectrum of your activities, products, and services, as well as other things that create the context of your organization.

Financial, physical, and human resources needed for managing the EPE must be provided by the management. Depending on the capability and resources of the organization, the starting EPE scope can be limited to those elements of activities, products, or services with the highest priority set by the management. Over time, the initial scope of the EPE can be expanded to include the rest of the activities, products, and services.

No single measurement will accurately reflect a company's overall environmental performance. A properly selected set of measures, used as a system, is required to provide the types of information necessary for decisions and action plans.

Good management practices include regular monitoring on both a short- and long-term basis. An effective monitoring process provides ongoing, systematic information that strengthens project implementation. The monitoring process provides an opportunity to:

a) Compare implementation efforts with original goals and targets,
b) Determine whether sufficient progress is being made toward achieving expected results
c) Determine whether the time schedule is observed.

Monitoring

An effective monitoring and data management system records the performance of all institutions with implementation responsibilities. It provides a system of accountability for all responsible parties on how well they are achieving the goals and targets established in the IMS. The responsibility of appropriate application of the monitoring system lies with the responsible persons/organisations/authorities assigned to this activity and has to follow the reporting duties as outlined during the “organisational setup phase.

An eEffective Monitoring and Reporting System ideally includes the Following Elements:

- Clearly articulated targets and a set of indicators to measure performance;
- A schedule and set of guidelines for all responsible parties to report to each other;

- An opportunity for responsible parties and stakeholders to periodically meet to coordinate actions and review each other's performance
- A link between the evaluation reports and relevant statutory planning cycles of the municipality, such as annual budgeting and capital planning, so that the municipality can adjust its plans as based on the actions taken by other sectors.

Collecting Data

In preparing the monitoring setup, it is good to check the following questions:

- For which indicators are data currently being collected?
- What are key information sources? Are representatives from these information sources already involved in the IMS process?
- How valid and accurate are the data?
- Are the data easily accessible and available?
- Are there any costs associated with acquiring the data?
- For those indicators where no data currently exists, which steps should be taken to collect new data? How expensive would a new data collection effort be?

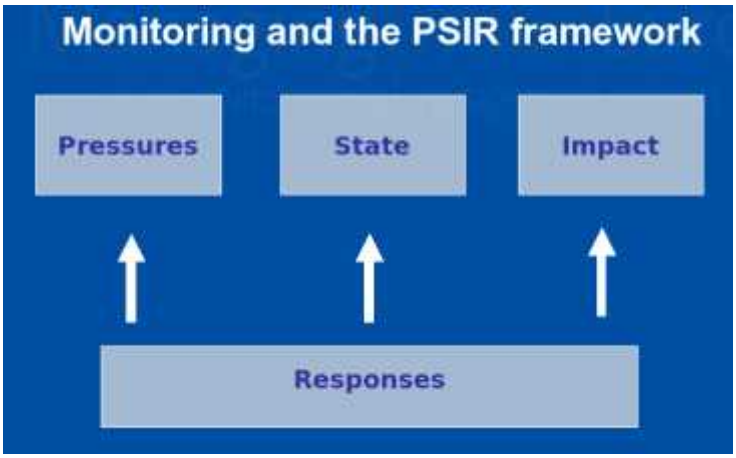
Ideally, most monitoring processes include collecting both quantitative and qualitative data.

Quantitative data is information that can be counted and measured. Quantitative environmental data focuses on actual environmental improvements, such as the amount of waste reduced or energy saved. Mechanisms for collecting quantitative environmental data are usually programme-specific, such as using water meters to measure actual water consumption.

Qualitative data is a more difficult measurement of programme success. It includes assessments of problems encountered, stakeholder satisfaction, and unanticipated benefits. Qualitative data can give a real understanding of the actual impact the actions are making on people's lives. It is usually collected through instruments such as surveys and personal interviews. In order to have a better understanding of the successes and challenges, it is advisable to collect both types of data. For example, to address persistent water shortages, a town may decide to implement a pilot water conservation programme to install low-flow showerheads in residences. A quantitative data collection effort would focus on how much water has actually been saved, while qualitative data would reveal how satisfied consumers were with the performance of the new showerheads. Both types of information are imperative to determine whether the program was successful.

"**Pressures – State - Impact – Response"**

When applying the analytical framework of "pressures – state - impact – response" to monitoring, it becomes obvious that all of the four areas need to be monitored. Ideally, this has already been taken into account when choosing the indicators. If not, the indicators can still be sorted at this point according to the schematic to facilitate the analysis:



To take a concrete example, if you want to monitor the effectiveness of an action, say a noise protection wall, you need to measure

- whether the wall has been erected (response),
- whether the noise level has been reduced as a result of the wall (state),
- or if the source of the noise has decreased (independently of this action, maybe due to related measures in the action plan) (pressure),
- and finally, if the affected people living there are less disturbed now (impact).

In collecting data, it is also important to distinguish between compliance monitoring versus effectiveness monitoring — both types of monitoring are important. Compliance monitoring measures whether the implementing institution did what it said it was going to do (e.g., install 5,000 low-flow showerheads, or to use the above example, the noise protection walls have been installed), while effectiveness monitoring measures whether the actions achieved their intended result (e.g., reducing water usage by 20% per household, or the decibels behind the wall are a certain rating lower). Of course, the real measure of success is effectiveness, i.e., how well conditions are improving. However, compliance monitoring is a critical piece of the evaluation process to help determine whether implementing institutions have fulfilled their commitments, and it helps to analyse why goals were not reached where this is the case.

Systematic Data Collection

This system can be as simple as using standardized reporting forms to facilitate the collection and compilation of data up to an entirely computerized data-sharing system. Nevertheless, what counts is not the level of high-tech computer application that is installed to manage your data, but whether the indicators chosen and the items monitored accurately reflect the progress of implementation and allow for an analysis of deviation from targets and goals.

Be sure to collect data on the indicators prior to beginning the implementation of the strategic programme. Ideally, you used the same set of indicators already for the collection of data for the baseline review, upon which the impacts of implementing selected actions will be measured.
In practical terms, data collection is less troublesome if it is organised systematically and in a reproducible way, i.e.,:

- Establish overviews of existing data sources in the form of inventories and a meta-database;
- Prepare templates and guidelines on data handling, technical documentation of the data and analytical methods used;
- For each dataset and indicator (diagrams, tables and maps), maintain a paper or electronic fact-sheet with description of data source, data quality, methods for data compilation, other relevant information and its graphical draft.

Each institution submits information to the responsible coordinator, who is responsible for assuring the system and who compiles this information into a report. The more specifically the coordinator formulates what he/she expects the different departments to monitor, the easier it will be to systematically store and later retrieve this information, to make it accessible to a larger audience and to evaluate the results.

- Example: A monitoring form for a specific action

A good monitoring and evaluation process engages all stakeholders and is useful to those ultimately responsible for improving the project. Evaluation is also an important public awareness and educational tool.

The objective is to use synergies, avoid double work and report as efficiently as possible. Please consult the section “organisational setup”, which has further information on reporting routines.

To monitor the realisation of the action in accordance with the action plan is easier than monitoring their effects. The coordinator needs to receive feedback from the responsible persons regarding the..

- realisation of the activity - yes/no?
- agreed timetable
- assigned resources
- modifications

With this information, the coordinator is able to control the compliance of the implementation process with the action plan and to elaborate one part of the interim report or internal audit report.

Corrective Measures

A well-organised monitoring system is able to detect deviations from the set direction promptly. The mistake can be analysed immediately, corrective measures taken as soon as possible, and damage or loss minimised.

Communication and Involvement

The effectiveness of implementation is very much dependent on the partnerships developed and the involvement and cooperation of various stakeholders. This is the step of actual action, which most often creates lots of challenges, mainly due to the fact that it requires the cooperation of different sorts of groups with various stakes. Planning is usually much less complicated than the actual implementation of the action plan.

At this stage, questions about cross-sectoral cooperation and multi-stakeholder involvement and cooperation appear. Is the organisational set-up cross-sectoral enough? Are those to implement working together for a common objective? Is the common objective of sustainability clear? Are departments cooperating with each other and are the relevant stakeholders involved? Are the targets SMART? Are indicators available and measurable? Is the timetable realistic? In order to make things happen, address all these issues in line with the development of the integrated management system in the city.

The public needs to know what is ongoing. To inform the public about the implementation of the action plan may play the decisive role as to whether the implementation will be successful or not happen at all. Very often the effectiveness of the implementation depends on citizens' involvement. In this case, combine information about the ongoing implementation processes with the call for cooperation and involvement. The examples are various: waste separation, rational energy use (decreasing energy consumption in households) or water-saving measures, to name just a few.

Environmental Auditing

What is Environmental Auditing/PURPOSE?

Environmental auditing is essentially an environmental management tool for measuring the effects of certain activities on the environment against set criteria or standards. Depending on the types of standards and the focus of the audit, there are different types of environmental audit. Organisations of all kinds now recognize the importance of environmental matters and accept that their environmental performance will be scrutinized by a wide range of interested parties. Environmental auditing is used to..

- investigate
- understand
- identify

These are used to help improve existing human activities, with the aim of reducing the adverse effects of these activities on the environment. An environmental auditor will study an organisation's environmental effects in a systematic and documented manner and will produce an environmental audit report. There are many reasons for undertaking an environmental audit, which include issues such as environmental legislation and pressure from customers.

Definitions

The term 'audit' has its origins in the financial sector. Auditing, in general, is a methodical examination - involving analyses, tests, and confirmations - of procedures and practices whose goal is to verify whether they comply with legal requirements, internal policies and accepted practices.

The International Chamber of Commerce (ICC) produced a definition in 1989 which is along the same lines

A management tool comprising systematic, documented, periodic and objective evaluation of how well environmental organisation, management and equipment are performing with the aim of helping to safeguard the environment by facilitating management control of practices and assessing compliance with company policies, which would include regulatory requirements and standards applicable.

Source: International Chamber of Commerce (1989)

There are other definitions available, although the above definition is still seen as the industry standard. The key concepts, which occur in all the definitions, are as follows.

- **Verification**: audits evaluate compliance to regulations or other set criteria.
- **Systematic:** audits are carried out in a planned and methodical manner.
- **Periodic:** audits are conducted to an established schedule.
- **Objective**: information gained from the audit is reported free of opinions.
- **Documented**: notes are taken during the audit and the findings recorded.
- **Management tool:** audits can be integrated into the management system (such as a quality management system or environmental management system).

What are the main benefits and costs?

There are a number of benefits to a firm undertaking an environmental audit. Some of the benefits are obvious, while others are less easy to identify. Two of the more easily recognised benefits are..

- increased management effectiveness
- cost savings

These will be discussed in turn, and then some of the other, less obvious, benefits will be covered briefly.

Increased Management Effectiveness

To manage an organisation effectively, management must be aware of every aspect of the organisation's operational procedures and processes. An environmental audit should reveal any weaknesses in the structures and, when these are rectified, the management can be confident that nothing has been overlooked and nothing unexpected is likely to occur.

An environmental audit can enable management personnel to become aware of many environmental issues of which they formerly may have been less well informed. This is especially the case in organisations with multiple facilities or with large manufacturing operations, where the senior managers and directors are often located at a distance, for example, in the head office. Managers may not have visited many of the sites where there are obvious environmental risks and, even if they have, they may not have the appropriate knowledge or training to identify that risks are present. The use of environmental audits can provide management with the confidence that any actual or potential risks have been identified.

However, auditing by itself does not improve environmental performance. An environmental audit merely provides a 'snap-shot' of what is happening at that moment in time, and doesn't help to ensure ongoing management effectiveness and the proper operation of systems and procedures. As a tool which aids decision-making and management control, an environmental audit is often carried out as part of an overall environmental management system.

Cost Savings

An environmental audit should identify opportunities for improvements in an organisation's management, and this will often lead to savings in spending. This is particularly common in the case of 'issue' audits, such as the water or waste audit.
As an example, waste minimisation is an area where there are many opportunities for an organisation to save money. Waste requires to be disposed of, and this itself costs money. For instance, companies are charged for disposing of waste into licensed landfill facilities, or it may be necessary to pay for special treatment of a chemical before disposal. Reducing the amount of waste produced can therefore lead to savings, as the organisation has to dispose of a smaller quantity. An obvious way of minimising the amount of waste generated is to minimise inputs. Adopting a more efficient process could mean that fewer raw materials are required, and that the overall cost of raw materials is therefore reduced. Reductions in the amount of water required can also lead to savings, as organisations are almost always charged for their water usage.

Recycling not only leads to a reduction in the total amount of waste produced, and the associated financial benefits of this, but can also lead to direct cost savings. For example, the by-products of one process may have potential uses in another. In addition, the recycling of water, which may involve treating/cleaning/cooling can also lead to a reduction in wastewater disposal costs. It may be useful to explore the possibility of waste-exchange schemes, that is, selling your waste to other businesses to use as a raw material, or buying in waste for your own use. The former can lead to reductions in waste disposal costs, with the latter providing the possibility of reduced raw material costs.

An issue audit will often highlight the need for an ongoing programme of improvements. A waste audit can lead to the implementation of a waste reduction programme, which may feature the major redesign of products, or simply minor changes to working practices. Organisations, which carry out an environmental audit in order to establish that they are in compliance with environmental legislation, can benefit financially in another way. An audit identifies any areas where an organisation may be in breach of regulations, and if these problems are subsequently corrected, financial loss through plant closures, clean-ups or restrictions imposed by government bodies or through bad publicity can be avoided.
The opportunity to make savings is not limited to large companies. Even small companies who think that environmental issues are of no relevance to them cannot operate in isolation from environmental issues. Environmental management is, in many ways, simply good business management, and the environmental audit makes the management aware of several issues, which would otherwise not have come to light, and also identifies means of gaining financially. As well as reduced costs from minimising waste, reducing use of raw materials and so on, other areas where savings can be made include:

the possibility of reduced insurance premiums for good environmental performance (refer to environmental liabilities and insurance costs discussion earlier)
reduced likelihood of unexpected pollution events, therefore less chance of incurring costly fines

The benefits of environmental auditing described so far are largely financial, and can be measured directly. A range of less tangible benefits can also be identified, including;

increased awareness of environmental policies and responsibilities among the whole workforce
increased management confidence due to a feeling of security that the compliance (and safety) status of the plant is confirmed and documented
favourable publicity
improved relationship with regulatory authorities
better understanding of consumer demands

However, there may also be various perceived disadvantages associated with undertaking an environmental audit, for instance..

disruption of plant activity while the audit is carried out
the cost of the exercise
the possible perception by staff in the organisation that an audit is a negative process, which assesses their performance

Most of these can be minimised or overcome by careful forward planning to ensure that the audit runs smoothly. Adopting an informal and approachable stance and pointing out the positive aspects of undertaking an audit can dispel any fears or misconceptions held by the staff. The cost of the audit can often be recovered by savings made through improvements identified in the audit and a number of auditing companies peg their fees to the savings made subsequently, or may operate on a 'no gain, small fee' basis.

Different Types Of Audits

Introduction to the Types of Audit

You have seen that the reasons for undertaking an environmental audit are many and varied. Some audits are carried out for an entire industry or company, while others are for a specific site. Some audits will endeavour to investigate all aspects of environmental performance, while others are narrowly defined. An environmental audit is essentially a process, and the way in which this process is utilised will depend on what the organisation wishes to achieve from the audit - this leads to the use of different 'types' of audit.

One of the problems when discussing the various uses of environmental auditing is that different people use different names to describe the different 'types'. The list below (after Humphrey and Hadley 2000) will act as a starting point for the purpose of this unit.

Corporate Audit

- **Compliance**, eg
  - Regulatory
  - EMS
  - Internal standards
- **Liability**, eg
  - Pre-acquisition
  - Divestment
  - Insurance
- **Single Issue**, eg
  - Waste minimization
  - Transport etc

Product Audit

Lifecycle Assessment etc

There are lots of different ways of defining these different types of audits and often different terms are used for the same sort of audit. Other terms you may come across include: health and safety audit, minimisation audit (a form of issues audit above, site audit, due diligence audit (a form of liability audit), activity or operational audit (eg across company departments or units, such as waste and energy management).

A compliance (or legislative) audit aims to determine the degree of company compliance with current or prospective legislation or standards, including, for example, discharge consents. A liability (or transactional) audit is usually conducted prior to buying or selling a facility/land in order to identify potential liabilities, both financial and legal. A minimisation audit generally concentrates on a single issue, for example, waste or water, and seeks to identify ways to reduce the amount of waste produced, or water consumed. This may be the same as an issue audit which concentrates on a topic that has been identified as requiring further investigation, for example, packaging. Policy compliance audits are primarily internal management tools, and determine the depth of compliance with company policy (internal standards in the list above). They should also act as a means of establishing future strategy. These audits have a similarity with legislative audits, in that, in both cases, compliance is being determined: in one case it is compliance with legal requirements, in the other, compliance with company environmental policies. Environmental management systems audits are internal audits which are part of any management systems approach. Environmental management systems audits provide the means by which the effective operation of the system can be checked, and remedial action taken if necessary.

Although the majority of the audits described above would be applicable to a particular industry or site, it is also possible to carry out audits for an entire industry and for public authorities, for example, a local authority.

Whatever the objectives, carrying out an environmental audit essentially involves three main questions for an organisation.

- What are our current effects on the environment?
- Can we reduce our negative effects on the environment?
- How can we make further improvements?

This applies equally to an audit of an entire organisation, a single site, or even an audit of a particular issue, for example, energy.

The Audit Process

The audit process can be broken down into a number of audit phases

Auditing standards Require the Audit to be properly planned;

This is to ensure that the audit is conducted in an effective and efficient manner. Planning involves all the issues the auditor should consider to develop an overall audit strategy and audit plan for conducting the audit. Therefore, the outcome of the auditor's planning process is a written plan that sets forth the overall audit strategy and the nature, extent, and timing of the audit work.

Gathering Audit Evidence

After the auditor has planned the audit the auditor needs to gather sufficient appropriate audit evidence on which to base his/her audit opinion. The auditor gathers evidence by performing audit procedures. These audit procedures consists of test of controls and substantive procedures.

Test of Controls

Test of controls are performed either to test the system, because the auditor wants to place reliance on the controls (combined approach), or when substantive procedures on its own cannot produce sufficient appropriate audit evidence (e.g. performing an inventory count provides evidence on the existence of inventory).

The Auditor will only test key controls:

key controls are controls which contribute to the reliance the auditor can place on figures in the financial statements. The auditor is, therefore, not interested in testing controls which only contribute to efficient operations or providing good service to customers. When testing controls, the auditor can perform manual tests and/or use computer-assisted audit techniques (CAATs). These CAATs are referred to as 'system' CAATs. Should the auditor decide to rely on the computer environment when testing internal controls, the auditor should test both general and application controls.

Substantive Procedures

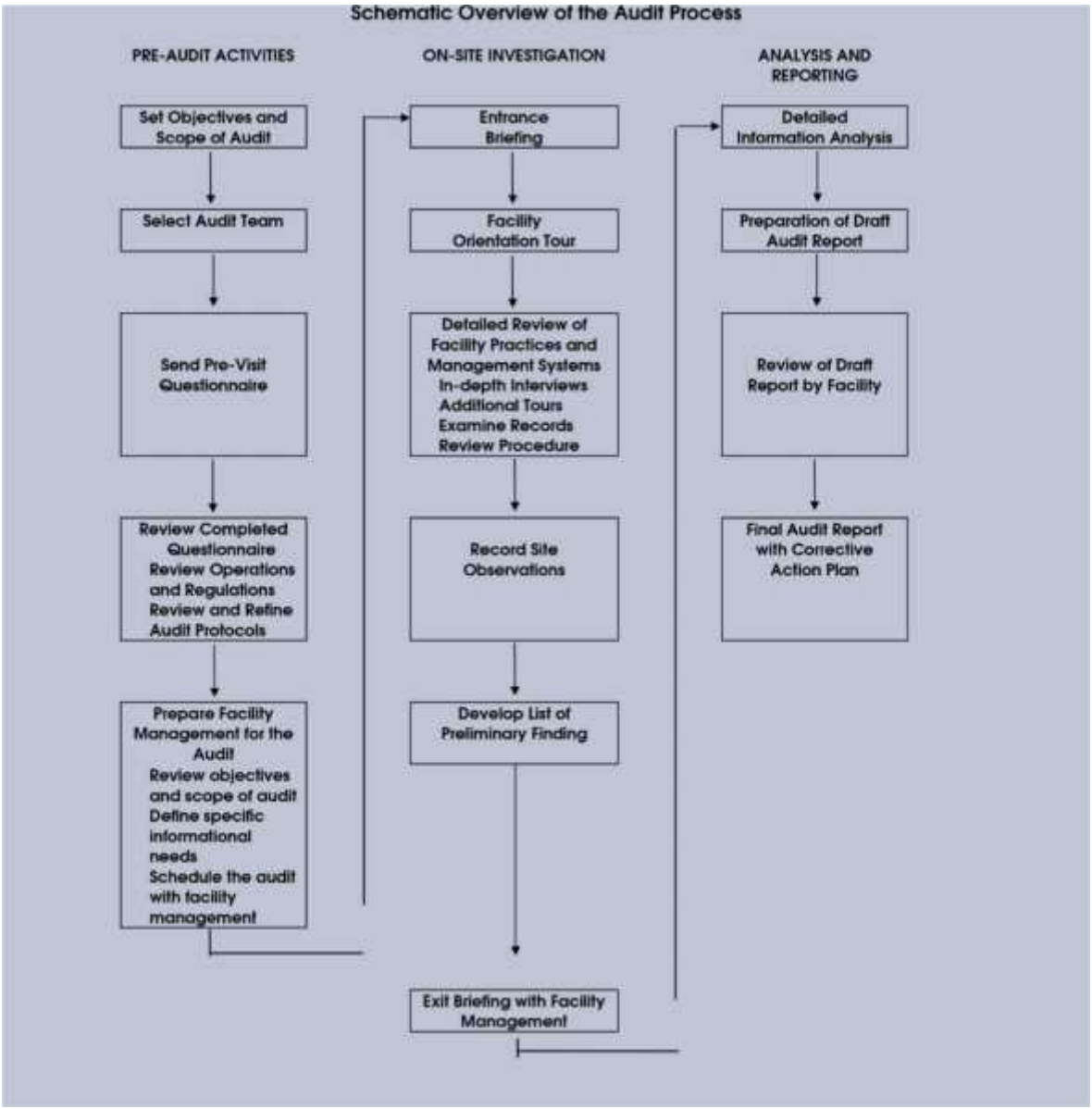
The auditor needs to perform substantive procedures to obtain sufficient and appropriate audit evidence to express an audit opinion. The assertions, either per transaction, balance or disclosure, together with the risks identified during the planning phase guide the auditor in developing substantive procedures. When performing substantive procedures, the auditor can perform either manual tests and/or use computer-assisted audit techniques (CAATs). These CAATs are referred to as 'data' CAATs. Data CAATs can be used to select samples, stratify information, analyse data, extract reports to identify items that require further investigation and to recalculate totals and calculations

Completing the Audit

Once the auditor has completed gathering evidence relating to the financial statement assertions the audit enters the completion phase The auditor shall obtain sufficient appropriate evidence in order to reach and justify a conclusion on the fairness of the financial statements.

Reporting

The final phase in the audit process is to evaluate the results of the audit evidence and choose the appropriate audit opinion to issue. The auditor's report is the main product or output of the audit.


Schematic Overview of the Audit Process
PRE-AUDIT ACTIVITIES
ON-SITE INVESTIGATION
ANALYSIS AND REPORTING
Set Objectives and Scope of Audit
Select Audit Team
Send Pre-Visit Questionnaire
Review Completed Questionnaire
Review Operations and Regulations
Review and Refine Audit Protocols
Prepare Facility Management for the Audit
Review objectives and scope of audit
Define specific informational needs
Schedule the audit with facility management
Entrance Briefing
Facility Orientation Tour
Detailed Review of Facility Practices and Management Systems
In-depth Interviews
Additional Tours
Examine Records
Review Procedure
Record Site Observations
Develop List of Preliminary Finding
Exit Briefing with Facility Management
Detailed Information Analysis
Preparation of Draft Audit Report
Review of Draft Report by Facility
Final Audit Report with Corrective Action Plan

Techniques For Gathering Information During The Audit Process.

Checklists

Checklists are very useful tools to use to ensure that different tasks or topics are included during the audit. They are very useful in specialised cases where a complex range of issues and questions need to be asked to ensure that nothing is missed.

One of the limitations of checklists is that there is a tendency to rely too much on a checklist and not look at matters that arise beyond the contents of the checklist or secondary questions and issues that may develop as a result of other information or observations. A checklist with all the sections carefully ticked off is not necessarily a true reflection of, say, a fully compliant site. If questions or check items have, for some reason, been left off or forgotten, this could have a significant impact upon the conclusions of the audit. It is for that reason that additional information needs to be used in support of checklists

Questionnaires (Audit Protocols)

Audit protocols or audit questionnaires provide the basis and structuring for most audits. They are based upon checklist questionnaires but are more complex and include more detail and sometimes logistical information and data relating to the audit and the site being audited. When developing protocols, every effort should be made to avoid generating questions that can be answered by a simple “yes” or “no”. The purpose of questions in protocols is to trigger supplementary questions, additional information not specifically asked in the question and encourage a two-way dialogue.

Observation

Observation is a vital component of an auditing exercise. Observation is a disciplined activity which must be carried out in a very deliberate and controlled manner. Human behaviour being what it is, there is often a tendency to “see what we want to see rather than see what is there”. Similarly, one may make an observation and see a fragmentary part of a scene or activity and assume the rest, rather than checking the entire scene. The idea of looking at something twice is important because it is part of the process that checks that the observation is accurately noted, analysed and recorded

Photographs

Photographs are a very valuable aid in the audit process. However, in order to use them, a number of important practical points must be borne in mind. The first point is that formal approval to bring a camera on to site for the audit must be obtained before the audit begins.

"Drill Down" Sampling

Drill down sampling refers to the process of investigating data as far back as possible, going right back, for example, to the point where the operator read the pressure dial and wrote the reading down on a clipboard. It is necessary, on a sampled basis, to drill down to information or action source in a number of situations to check whether a system is working and that the data being generated through the system's requirements, is actually being generated, recorded and utilised. Generally, as one finds more errors, faults and nonconformance, one tends to increase the size and scope of the drill down sampling to explore whether the problems are of an isolated nature or whether they reflect a systems breakdown.

Research

It is useful to try and undertake some background research and investigation into the site or company to be audited. Familiarisation with the operations, products, raw materials reports, press material and newspaper articles all provides useful background information to supplement questioning sessions and help understand the operational processes.

Example of the contents of an Audit Report

Executive summary

- Key findings and commentary
- Commentary on site tour and photographs
- Full list of all recommendations

Scope of Audit

- Areas audited, site location, audit focus

Date of Audit and participants

Detailed report

- Sections based upon topics covered in audit protocol

Conclusions and Recommendations Appendices

- Copy of audit protocol
- Photo log
- Supporting documentation (may be included in a separate volume)

Further Reading:

- ✓ *ISO 14001 Environmental Certification Step by Step: Revised Edition,By A J Edwards,(2003)*
- ✓ *Environmental Management Systems,By Christopher Sheldon, Mark Yoxon,(2012)*