EXPERT GROUP MEETING ON CO-OPERATION IN ENVIRONMENTAL MANAGEMENT OF IRON AND STEEL INDUSTRY FOR THE ARAB REGION
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SYSTEMATIC APPROACH TO ENVIRONMENTAL AUDITING IN IRON AND STEEL INDUSTRY

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Iron and steel industry utilizes highly complex systems and conversion processes which pose significant hazards to employees and environment. Improving the environmental performance of any of the existing plants will require the application of a proper Environmental Management System (EMS).

Environmental Auditing (EA) is an important component of any EMS. It may be defined as a management tool comprising a systematic, documented, periodic and objective evaluation of how well Environmental Organization, Management and Equipment are performing with the aim of helping to safeguard the environment.
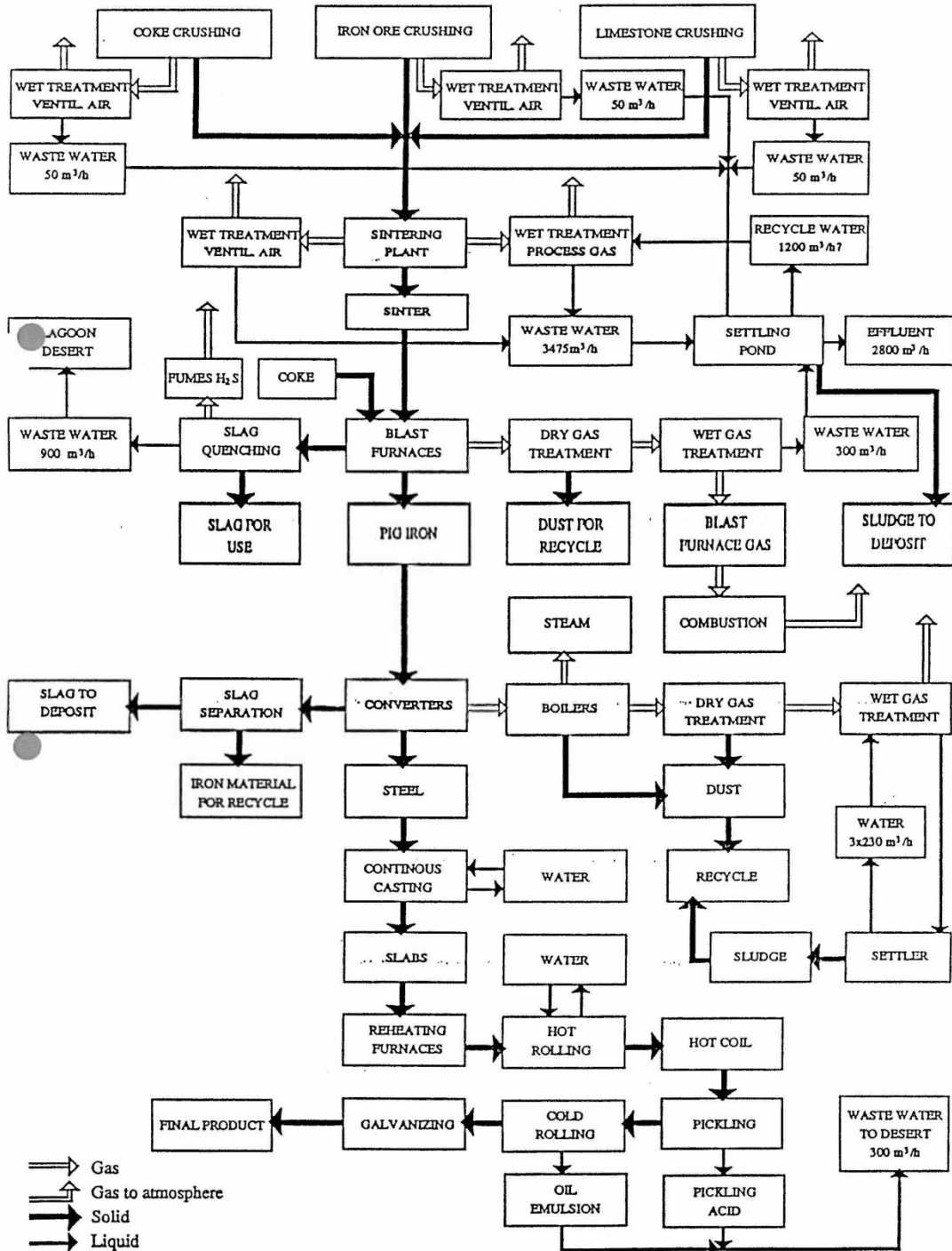
The ultimate objectives are:

a.   Facilitating management control of environmental practices.
b.   Assessing compliance with company policies which would include meetings regulatory requirements.

This presentation outlines the following subjects:
1.   ISO 14000 proposed EMS, principals and elements.
2.   Environmental auditing definition, components, benefits and management.
3.   Model EA Program.
4.   Iron and Steel Industry EA focal points.
5.   Basic steps of an EA.
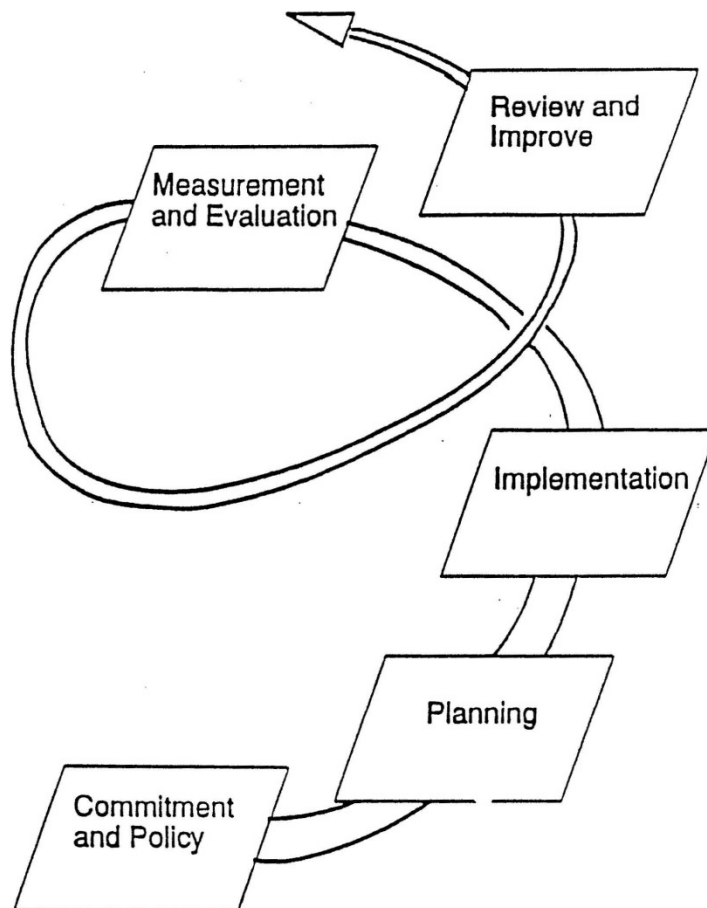
THE EGYPTIAN IRON AND STEEL COMPANY

Production Flow Diagram

Production Flow Diagram for The Egyptian Iron and Steel Company.

Process boxes and flows:

- COKE CRUSHING → WET TREATMENT VENTIL. AIR → WASTE WATER 50 m³/h
- IRON ORE CRUSHING → WET TREATMENT VENTIL. AIR → WASTE WATER 50 m³/h
- LIMESTONE CRUSHING → WET TREATMENT VENTIL. AIR → WASTE WATER 50 m³/h
- SINTERING PLANT → WET TREATMENT VENTIL. AIR
- SINTERING PLANT → WET TREATMENT PROCESS GAS → WASTE WATER 3475 m³/h
- SINTER → SINTERING PLANT
- RECYCLE WATER 1200 m³/h?
- SETTLING POND → EFFLUENT 2800 m³/h
- LAGOON DESERT
- FUMES H₂ S
- COKE
- WASTE WATER 900 m³/h ← SLAG QUENCHING
- BLAST FURNACES → DRY GAS TREATMENT → WET GAS TREATMENT → WASTE WATER 300 m³/h
- SLAG FOR USE
- PIG IRON
- DUST FOR RECYCLE
- BLAST FURNACE GAS → COMBUSTION
- SLUDGE TO DEPOSIT
- STEAM
- SLAG TO DEPOSIT ← SLAG SEPARATION ← CONVERTERS → BOILERS → DRY GAS TREATMENT → WET GAS TREATMENT
- IRON MATERIAL FOR RECYCLE
- STEEL
- DUST → RECYCLE
- WATER 3x230 m³/h
- CONTINOUS CASTING ← WATER
- SLABS   WATER   SLUDGE ← SETTLER
- REHEATING FURNACES → HOT ROLLING → HOT COIL
- COLD ROLLING ← PICKLING
- FINAL PRODUCT ← GALVANIZING ← COLD ROLLING
- OIL EMULSION
- PICKLING ACID
- WASTE WATER TO DESERT 300 m³/h

Legend:
⇒ Gas
⇑ Gas to atmosphere
→ Solid
→ Liquid

$WASTE WATER 50 m^3/h$

$RECYCLE WATER 1200 m^3/h$

$EFFLUENT 2800 m^3/h$

$WASTE WATER 3475 m^3/h$

$WASTE WATER 900 m^3/h$

$WASTE WATER 300 m^3/h$

$WATER 3 \times 230 m^3/h$

$WASTE WATER TO DESERT 300 m^3/h$

ISO 14000 Proposed Environmental Management System (EMS):

Continual Improvement

Review and Improve

Measurement and Evaluation

Implementation

Planning

Commitment and Policy

ISO 14000: ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) PRINCIPLES AND ELEMENTS

The EMS is best viewed as an organizing framework that should be continually monitored and reviewed to provide effective direction for an organization's environmental activities in response to changing internal and external factors. The environmental management system model follows the basic view of" an organization which subscribes to the following principles :

Principle 1

An organization should focus 011 what needs to be done - it should ensure commitment to the EMS and define its policy.

Principle 2

An organization should formulate a plan to fulfill its environmental policy.

Principle 3

For effective implementation an organization should develop the capabilities and support mechanisms necessary to achieve its environmental policy, objectives and targets.
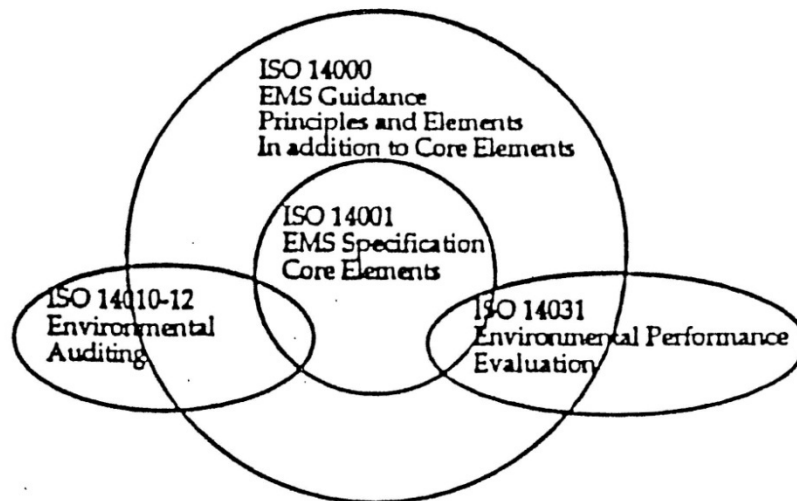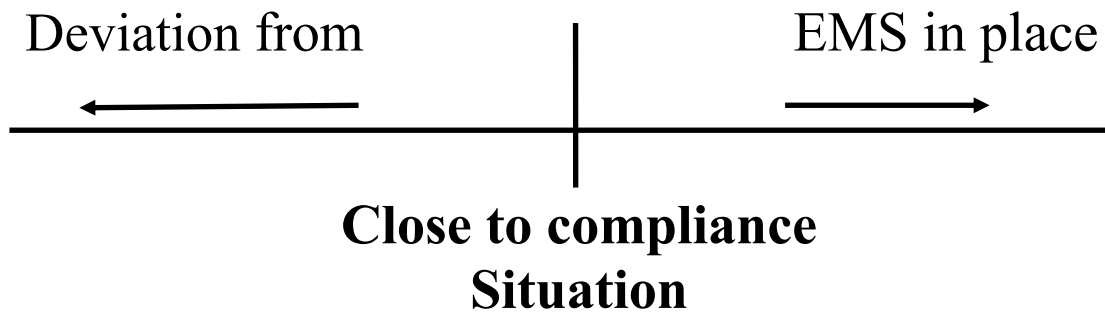
Principle 4

An organization should measure, monitor and evaluate its environmental performance.

Principle 5

An organization should review and continually improve its environmental management system, with the objective of improving its overall environmental performance.

Relation of Some ISO 14000 Documents

ISO 14000
EMS Guidance
Principles and Elements
In addition to Core Elements

ISO 14001
EMS Specification
Core Elements

ISO 14010-12
Environmental
Auditing

ISO 14031
Environmental Performance
Evaluation

Deviation from		EMS in place
←		→

Close to compliance
Situation

Basic Needs:

Plans
Project
Finance
O&M Systems
Organizational Development

Basic Questions:

- What are we doing? In particular, are we in compliance with government regulations, codes of practice, ….?
- Can we do better? In particular, are there non-regulated areas where operations can be improved o minimize the impact on the environment?
- Can we do it more cheaply?
- What more should we do?

Definition of Environmental Auditing (EA):

EA is a management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organization, management and technology are performing with the aim of helping to safeguard the environment by:

i)   Facilitating management control of environmental practices.

ii) Assessing compliance with company policies, which would include meeting regulatory requirements.

Elements to be audited:

- ☐ Policy

- ☐ Systems and procedures

- ☐ Processes

- ☐ Performance

EA is an internal process:

☐ because EA goes beyond compliance appraisal and requires open discussion of confidential business and operational information.

☐ because it may involve discussions about strategic considerations of ways to improve operations, reduce costs, improve product quality.

☐ because of the importance of maintaining a relationship of trust between auditors and auditees and avoid any hiding of problems.

Iron and Steel Industry

EA Benefits:

- Increasing awareness of environmental policies and responsibilities;
- Providing an opportunity for management to give credit for good environmental performance;
- Identifying potential cost savings, for example those which might arise from waste minimization;
- Providing an up-to-date environmental database, which can be drawn on when making decisions in relation to plant modifications etc. or for use in emergencies;
- Evaluating training programmes and providing information for use in training staff.

Model Environmental Audit Program
(Source UNEP Environmental Auditing Report, 1989)

Component 1: Environmental Review Elements

Policy and Responsibilities
Communications

Training
Risk assessment

Monitoring program

Environmental impact
studies and research
Equipment operation and
maintenance
Air emission control

Water effluent control

Land impact
Solid/hazardous waste
management
PCB Program
Transportation of
dangerous goods
Fuel and chemical
storage
Water supply

Security

Miscellaneous

Component 2: Industrial Hygiene Elements

Policy
Regulatory compliance
Staffing
Facilities
Industrial hygiene/
Occupational health

Equipment
Health hazard evaluation
Record-keeping
Health hazard control

Training

Component 3: Occupational Health Elements

General	Company health department
Medical surveillance	Company health relation with other occupational health specialists
Workplace contamination	Meetings
Medical surveillance-jobs	Equipment
Programs	

Component 4: Emergency Preparedness

Policy and Responsibilities	Training
Risk evaluation	Community response and public relations
Emergency plan framework	Legal
Emergency equipment and physical facilities	Security
Internal communications	Plant maintenance
	Miscellaneous

Iron and Steel Industry
Environmental Auditing Focal Points

Environmental Management:
Organization
Scope and job description
Responsibilities
Resources
Information processing

Production Departments:
Responsibilities
Resources
Process documentation
Built-in monitoring systems
Information processing
Upgrading improvement plans

Compliance:
National laws and regulations
Internal Control Systems

Pollution Control Technology:
State-of-the-art
Existing systems:
Efficiency
Maintenance
Operating procedures

Impact on In-Plant Environment:
Industrial Hygience Elements
Occupational Health Elements

Impact on External Environment:
Groundwater
Receiving surface water
Atmosphere

Accident Management:
Risk assessment of accidental emissions
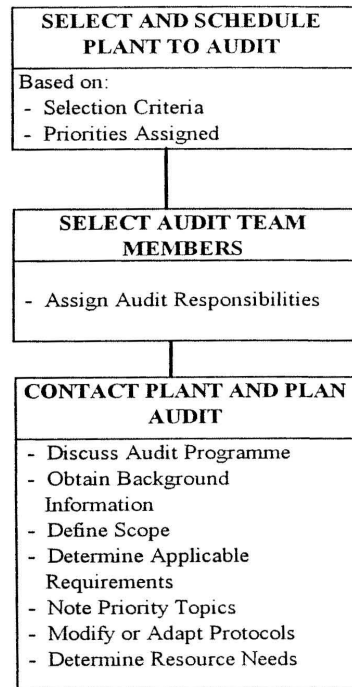Preventive measures
Information and reporting

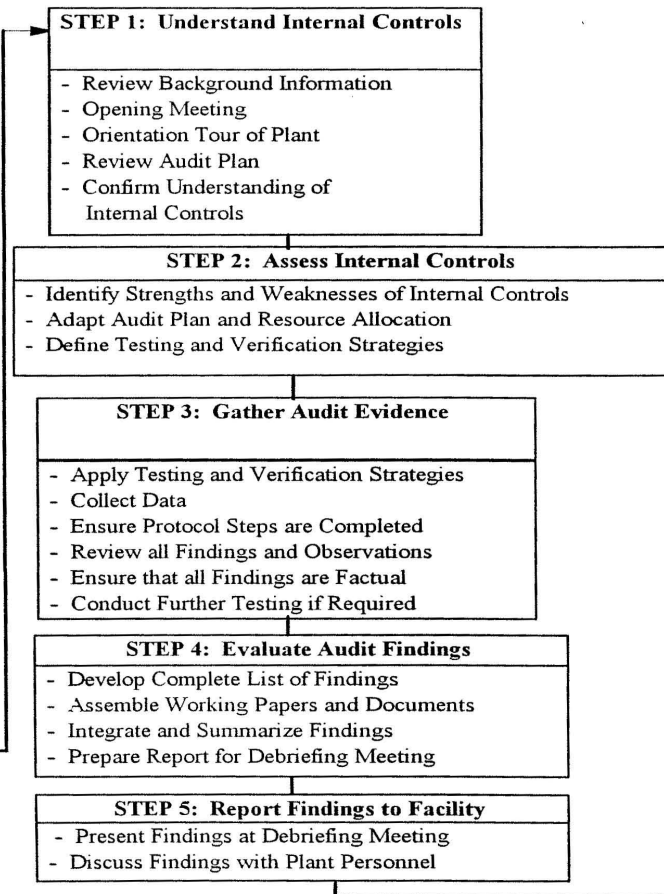**Hazardous/special wastes management:**
Control and management systems
Record keeping

BASIC STEPS OF AN ENVIRONMENTAL AUDIT

PRE-AUDIT ACTIVITIES

SELECT AND SCHEDULE PLANT TO AUDIT

Based on:
- Selection Criteria
- Priorities Assigned

SELECT AUDIT TEAM MEMBERS

- Assign Audit Responsibilities

CONTACT PLANT AND PLAN AUDIT

- Discuss Audit Programme
- Obtain Background Information
- Define Scope
- Determine Applicable Requirements
- Note Priority Topics
- Modify or Adapt Protocols
- Determine Resource Needs

ACTIVITIES AT SITE

STEP 1: Understand Internal Controls

- Review Background Information
- Opening Meeting
- Orientation Tour of Plant
- Review Audit Plan
- Confirm Understanding of Internal Controls

STEP 2: Assess Internal Controls

- Identify Strengths and Weaknesses of Internal Controls
- Adapt Audit Plan and Resource Allocation
- Define Testing and Verification Strategies

STEP 3: Gather Audit Evidence

- Apply Testing and Verification Strategies
- Collect Data
- Ensure Protocol Steps are Completed
- Review all Findings and Observations
- Ensure that all Findings are Factual
- Conduct Further Testing if Required

STEP 4: Evaluate Audit Findings

- Develop Complete List of Findings
- Assemble Working Papers and Documents
- Integrate and Summarize Findings
- Prepare Report for Debriefing Meeting

STEP 5: Report Findings to Facility

- Present Findings at Debriefing Meeting
- Discuss Findings with Plant Personnel

POST AUDIT ACTIVITIES

ISSUE DRAFT ACTIVITIES

- Determine Distribution List
- Distribute Draft Report
- Allow Time for Review

ISSUE FINAL REPORT

- Finalize Draft Report
- Highlight Requirement for Action Plan
- Determine Action Plan Preparation Deadline

ACTION PLAN PREPARATION AND IMPLEMENTATION

- Based on Audit Findings in Final Report

FOLLOW-UP ON ACTION PLAN