

# **Subject - Environmental Protection and Management Subject Code - 21CV753**

**Group - 10** 

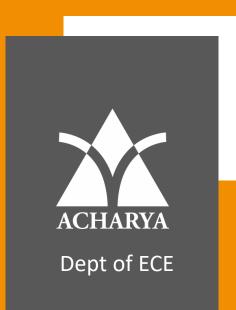
**Topic -** Waste Audits and Pollution Prevention opportunities in Textile , Sugar, Pulp & Paper, Electroplating, , Tanning industry, Dairy, Cement, Chemical industries, etc. Trans boundary movement, disposal, procedures, of hazardous wastes.

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### **Definition of Waste Audits**



- Evaluates waste management
- Reduces costs
- Ensures compliance





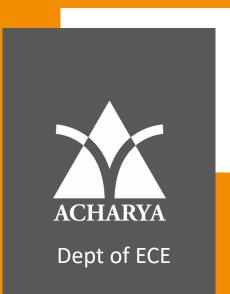


## **Importance of Pollution Prevention**

- Minimizes environmental harm
- Conserves resources
- Enhances public image

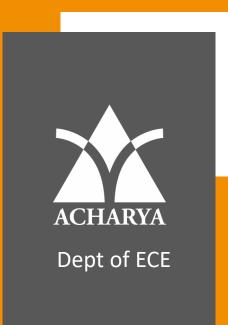






- Textile Industry
- Sugar Industry
- Pulp and Paper Industry
- Electroplating Industry
- Tanning Industry
- Dairy Industry
- Cement Industry
- Chemical Industry





## Waste Audits in the Textile Industry

- Overview of Textile Waste
- Types: Water discharge, chemical runoff, energy waste.
- Impact: Pollutes water bodies, depletes oxygen, harms soil productivity.
- Waste Audit Procedures
- Data: Gather waste data from processes like dyeing, sizing, and bleaching.
- Analysis: Evaluate waste composition and identify inefficiencies.



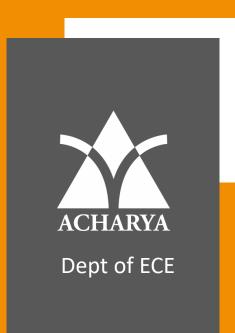


## **Waste Audits in the Textile Industry**

- Pollution Prevention Opportunities
- Water: Reduce and recycle water in processes like dyeing and washing.
- Chemicals: Replace toxic substances with eco-friendly alternatives.
- Practices: Implement air dyeing, reuse treated effluents, and adopt best practices.







## Waste Audits in the Sugar Industry

- Overview of Sugar Waste
- Waste types: Water, effluents, sludge
- Environmental impact: Pollution, soil degradation
- Waste Audit Procedures
- Monitoring: Freshwater usage tracking
- Effluents: Analyzing waste generation patterns



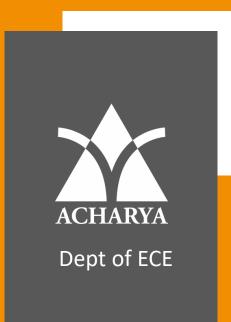


## Waste Audits in the Sugar Industry

- Pollution Prevention Opportunities
- Water recycling: Effective reuse methods
- Waste minimization: Strategic reduction techniques
- Energy recovery: Utilize process by-products







## Overview of Pulp & Paper Industry Waste

- Types of Waste Generated
  - Wastewater: Washing, pulping, bleaching.
  - Solid Waste: Handling, screening, sludge.
  - Air Emissions: Sulfur, SO<sub>2</sub>, NOx.
- Environmental Impact
  - Water: Pollution.
  - Soil: Contamination.
  - Air: Degradation.





### **Waste Audit Procedures**

- Wastewater Treatment Analysis
  - **Primary**: Clarifiers.
  - **Biological**: Aeration, sludge.
  - **Segregation**: Targeted.
- Solid Waste Management
  - Reuse: Recycling.
  - Sludge: Dewatering.

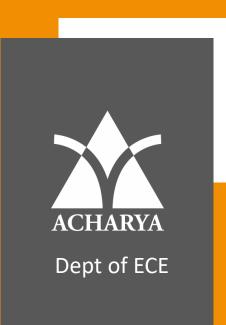




## **Pollution Prevention Opportunities**

- Process Optimization
  - Water: Recycling.
  - **Bleaching**: Recirculation.
  - Housekeeping: Efficient.
- Chemical Recovery Techniques
  - Black Liquor: Recovery.
  - Relime: Reuse.
  - **Lime**: Optimization.

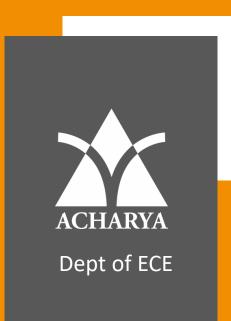




## **Pollution Prevention Opportunities**

- Use of Alternative Raw Materials
  - **Bagasse**: Renewable.
  - Enzymes: Biodegradable.
  - **Recycling**: Fibers.





## Waste Audits in the Electroplating Industry

- Overview of Electroplating Industry Waste
  - o **Types**: Cyanide, chromium, cadmium, solvents, sludges.
  - **Impact**: Groundwater, air, and soil contamination.
- Waste Audit Procedures
  - Chemical Usage: Evaluate inefficiencies.
  - Wastewater: Analyze pollutants.
- Pollution Prevention Opportunities
  - **Process Modification**: Optimize systems.
  - **Recovery & Recycling**: Reuse chemicals.
  - Non-toxic Alternatives: Safer substitutes.





## **Overview of Tanning Industry Waste**

- Types of Waste Generated
  - Liquid Waste: Wastewater containing high levels of organic and inorganic contaminants.
  - Solid Waste: Fleshings, trimmings, and shavings.
  - Gaseous Emissions: Volatile organic compounds (VOCs) and odoriferous gases
- Environmental Impact
  - Water Pollution: Discharge of untreated or poorly treated effluent.
  - Soil Contamination: Improper disposal of solid waste.
  - Air Pollution: Emission of VOCs and malodorous gases.
  - Biodiversity Loss: Impact on aquatic and terrestrial ecosystems.





### **Waste Audit Procedures**

- Monitoring Water and Chemical Usage
  - Water Usage
    - Measure water input and effluent output.
    - Optimize water recycling and reuse.
  - Chemical Usage
    - Maintain a detailed inventory of chemicals.
    - Substitute hazardous chemicals with eco-friendly alternatives.
- Solid Waste Management
  - **Segregation:** Separate biodegradable, recyclable, and hazardous waste.
  - **Recycling:** Convert fleshings and shavings into value-added products.
  - Composting: Organic waste for soil amendment.
  - **Disposal:** Environmentally compliant disposal methods for non-recyclable waste.





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## **Pollution Prevention Opportunities**

#### Cleaner Production Techniques

- Adoption of **wet-white tanning** to reduce chromium pollution.
- Use of enzymes for dehairing instead of chemicals.
- Efficient wastewater treatment technologies like membrane bioreactors.
- Integration of renewable energy sources.

#### • Waste Minimization Measures

- **Process Optimization:** Enhance process control to minimize waste.
- Raw Material Selection: Use high-quality hides to reduce rework and waste.
- Lean Manufacturing: Eliminate unnecessary steps that generate waste.





## **Pollution Prevention Opportunities**

- Resource Recovery:
  - Water Recovery: Treat and reuse wastewater.
  - Chemical Recovery: Recover chromium and other chemicals for reuse.
  - Energy Recovery: Utilize biogas from anaerobic digestion of organic waste.
  - Material Recovery: Convert waste into useful by-products (e.g., gelatin from trimmings).





## **Overview of Dairy Industry Waste**

#### Types of Waste Generated

- Wastewater: Rich in fats, proteins, lactose, and cleaning agents.
- Solid Waste: Includes sludge, packaging, and whey by-products.
- Air Emissions: Odor and volatile organic compounds.

#### • Environmental Impact

- High BOD and COD affect water bodies.
- Nutrient runoff leads to eutrophication.
- Improper disposal contaminates soil and water.
- Greenhouse gas emissions from energy use.





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### **Waste Audit Procedures**

#### • Wastewater Management

- Pre-treatment: Screening and removal of solids.
- Primary treatment: Fats, oils, and grease (FOG) separation.
- Biological treatment for organic content.
- Advanced methods: Membrane filtration, wetlands.

#### • Solid Waste Analysis

- Categorize into recyclable, biodegradable, and hazardous.
- Explore composting and animal feed options.
- Minimize and recycle packaging waste.







#### Wastewater Treatment Innovations

- Anaerobic digestion for biogas production.
- Advanced oxidation for persistent pollutants.
- Use of natural filtration systems like wetlands.

#### • By-product Utilization

- Convert whey into protein concentrates.
- Use sludge in biogas plants or as fertilizer.
- Recover milk solids for additional processing.





## **Pollution Prevention Opportunities**

#### • Energy Recovery

- Biogas generation from organic waste.
- Heat recovery systems for energy savings.
- Implement combined heat and power (CHP) systems.





## Overview of cement industry

- Waste audits in the cement industry focus on evaluating the types, amounts, and Environmental impact of waste generated during production.
- The goal is to identify areas for **waste reduction**, **reuse**, **and recycling** to improve sustainability.
- •Types of waste:
- •Solid waste: cement kiln dust (CKD), broken machinery, and scrap materials.
- •Liquid waste: wastewater from cleaning and cooling systems.
- •Gaseous emissions: co<sub>2</sub>, nox, and particulate matter.



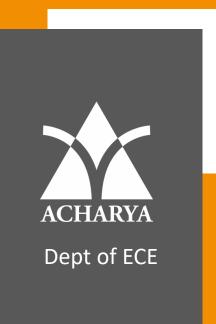


## Waste audit procedures

- **Identify waste streams:** catalog all types of waste generated.
- Measure waste quantities: quantify waste volumes through sampling and monitoring.
- Analyze waste: determine sources, disposal methods, and opportunities for waste reduction.
- **Report findings:** propose solutions for improving waste management and sustainability.

#### **Emission monitoring:**

- Continuous monitoring: use technologies like continuous emission monitoring systems (CEMS).
- Track pollutants: monitor gases like co<sub>2</sub>, nox, sox, and particulate matter.
- **Compliance:** ensure emissions meet regulatory standards to reduce environmental impact.
- Regular testing: conduct periodic inspections and tests for accurate data.



## Pollution prevention opportunities:



- Waste minimization: reduce waste at the source to prevent pollution.
- Cleaner production: use energy-efficient technologies and cleaner processes.
- Eco-friendly materials: replace harmful materials with safer, more sustainable options.
- **Process optimization:** continuously improve production processes to reduce emissions and waste.



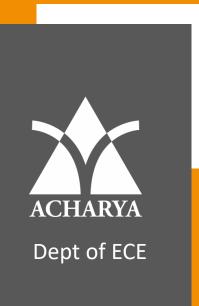
## **Overview of Chemical Industry Waste:**



- The chemical industry generates a wide range of waste products, including hazardous and non-hazardous waste.
- Waste audits are crucial to monitor the quantity, type, and impact of chemical waste generated.
- Goals include reducing waste, preventing pollution, and improving sustainability.

#### Types of waste generated:

- Hazardous waste: includes toxic by-products, solvents, acids, and heavy metals.
- Non-hazardous waste: organic residues, spent catalysts, and packaging waste.
- Gaseous emissions: vocs (volatile organic compounds), methane, and carbon monoxide.



## Waste audit procedures:



- **Identify waste streams:** catalog the types and sources of waste generated in the chemical processes.
- Measure quantities: quantify the amount of waste produced at various stages of production.
- Analyze disposal methods: evaluate current disposal methods and identify opportunities for improvement.
- Audit report: propose solutions for waste reduction, reuse, and recycling.

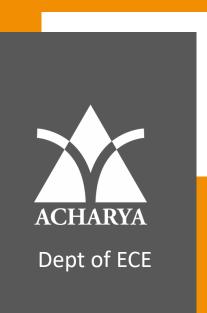


## Pollution prevention opportunities:



- Reduce waste at source: implement changes in production processes to reduce waste generation.
- Cleaner production techniques: adopt technologies that minimize waste and reduce harmful emissions.
- **Eco-friendly materials:** use safer and more sustainable materials to replace toxic chemicals.
- **Closed-loop systems:** recycle materials within the system to reduce environmental impact.





# **Definition and Importance of Transboundary Movement of Hazardous Wastes**

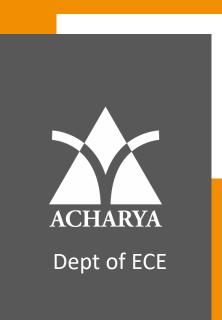
**Definition**: Transportation of hazardous waste across international borders for disposal, recycling, or treatment.

#### • Importance:

- **Environmental Protection**: Prevents pollution and protects ecosystems.
- Public Health: Reduces health risks from toxic exposure.
- Global Responsibility: Shared duty for sustainable waste management.
- Economic Considerations: Avoids costly clean-up and legal liabilities.







# **Regulations Governing Transboundary Movement**

- **Basel Convention**: Key treaty to reduce hazardous waste movement, requiring prior informed consent.
- EU Waste Shipment Regulation: Governs waste movement within/outside the EU, ensuring environmentally sound management.
- National Regulations: Countries have specific laws complementing international treaties.









## **Procedures for Compliance**

- Notification and Consent: Exporters must notify authorities and obtain consent from importing countries.
- **Documentation**: Essential records include waste manifests and contracts.
- Tracking and Reporting: Movement must be tracked and reported to ensure compliance.
- Compliance with Destination Regulations: Ensure waste meets importing country standards.







## **Case Studies and Examples**

- Basel Convention Case: Illegal export of hazardous waste from the U.S. to Africa highlighted enforcement needs.
- EU Waste Shipment Regulation Example: Legal actions against a member state for improper waste export.
- E-Waste Trade: Significant issue with improper management leading to environmental and health impacts.







- Landfill Disposal: Containment in engineered landfills; requires monitoring and strict regulations.
- **Incineration**: High-temperature burning to reduce volume and toxicity; requires emission control.
- Recycling and Recovery: Processing to reclaim resources; must comply with safety regulations.











## **Best Practices for Hazardous Waste Disposal**

- **Characterization**: Identify waste composition and hazards.
- **Segregation**: Separate hazardous from non-hazardous waste.
- **Documentation**: Maintain thorough records for compliance.
- **Training**: Educate personnel on safe handling and disposal.
- Emergency Preparedness: Implement response plans for spills or accidents.









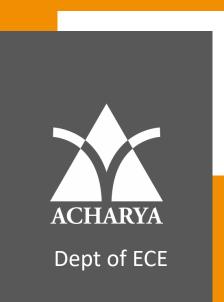
## **Regulatory Compliance and Standards**

- Overview: Compliance is essential for safe hazardous waste disposal.
- Key Regulations:
  - RCRA: Governs hazardous waste management in the U.S.
  - **Basel Convention**: Regulates transboundary waste movement.
  - EU Waste Framework Directive: Sets waste management principles in the EU.
- Compliance Requirements: Labeling, storage, disposal, and reporting standards.





## Conclusion



- Summary of Key Points: Effective disposal is crucial for health and environmental protection.
- Importance of Waste Audits: Identify improvements and promote sustainability.
- Call to Action for Industries: Develop comprehensive waste management plans and adopt pollution prevention measures.







