



CH1203 Industrial Pollution Prevention and Control

Balasubramanian S

Department of Chemical Engineering
SRM University

Topics Covered

- 1 Sustainability
- 2 Environmental Regulations
- 3 Pollution
- 4 Air pollution control methods
- 5 Principles of water treatment



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1

Sustainability

2

Environmental Regulations

3

Pollution

4

Air pollution control methods

5

Principles of water treatment



Topics Covered

2

Environmental Regulations

- Pollution prevention versus pollution control
 - Environmental policies and regulations
 - Regulations for clean environment
 - Environmental friendly chemical processes
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Environmental Regulations

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Environmental Regulations – Pollution Prevention vs Pollution Control

Pollution Prevention vs Pollution Control Approaches

Pollution Prevention	Pollution Control
Pollutants are prevented at the source	Pollutants are controlled by waste treatment methods
It is an integral part of process and product development	It is preferred whenever problem arises
Wastes are considered to be a potential resource and may be transformed into useful products that are not hazardous	Always considers cost factors

Environmental Regulations – Pollution Prevention vs Pollution Control

Pollution Prevention vs Pollution Control Approaches

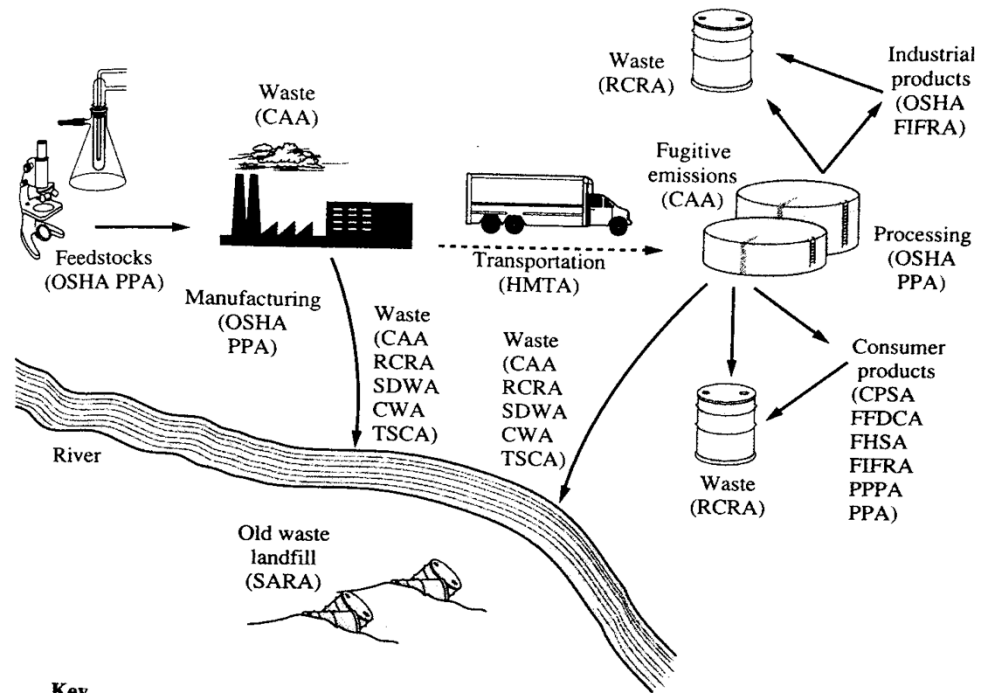
Pollution Prevention	Pollution Control
Environmental improvements includes non-technical and technical approaches	Environmental improvements are accomplished with techniques and technology
Quality means production of goods that meets customers need and have minimal impacts on human health and environment	Quality means just meeting the customers requirement

Environmental Regulations – Laws and Regulations

Laws are generally written to be very broad in scope and provide only the frame work for the enforcement; actual implementation of what is written in law is carried out through regulations (guidelines and documents)

When a government passes a law such as Clean Air Act (CAA) and give it to the Environmental Protection Agency (EPA) to develop and begin implementing regulations

Environmental Regulations – Laws and Regulations



Key

- | | |
|--|---|
| CAA – Clean Air Act | OSHA – Occupational Safety & Health Act |
| CPSA – Consumer Product Safety Act | PPA – Pollution Prevention Act |
| CWA – Clean Water Act | PPPA – Poison Prevention Packaging Act |
| FFDCA – Fed. Food, Drug & Cosmet. Act | RCRA – Resource Conservation and Recovery Act |
| FHSA – Fed. Hazardous Substances Act | SARA – Superfund Amendments & Reauthor. Act |
| FIFRA – Fed. Insect., Fungi. & Rodent. Act | SDWA – Safe Drinking Water Act |
| HMTA – Hazardous Mat'ls Transport. Act | TSCA – Toxic Substances Control Act |

Environmental Regulations – Laws and Regulations



Environmental Regulations – Laws and Regulations

Clean Air Act

The objective of [Clear Air Act](#) is protect and [enhance air quality to promote public health](#) and [welfare](#)

CAA also focus on [reducing emissions from automobiles \(vehicles\)](#) and on development of [cleaner fuels, such as alcohol or natural gas](#)

Environmental Regulations – Laws and Regulations

Clean Air Act

The objective of Clear Air Act is **protect and enhance air quality to promote public health and welfare**

Regulations

Regulations are **enforced through emission standards** on stationary and mobile source of air pollution

Regulatory board - **United States Environmental Protection Agency (USEPA)**

Environmental Regulations – Laws and Regulations

Regulatory board - United States Environmental Protection Agency

National Ambient Air Quality Standards

Toxic Air pollution sources

- mobile sources
- small stationary sources (area sources)
- large industrial sources (point sources)

Environmental Regulations – Laws and Regulations

Regulatory board - United States Environmental Protection Agency

National Ambient Air Quality Standards – Air Quality Standards

Primary Standards – were established for protection of public health, including the health of “sensitive” populations such as asthmatics, children and the elderly peoples.

Secondary Standards – were established to protect public welfare including protection against decreased visibility and damage to animals, crops, vegetation and buildings.

Environmental Regulations – Laws and Regulations

Regulatory board - [United States Environmental Protection Agency](#)

National Ambient Air Quality Standards – [Air Quality Standards](#)

[Defines the Hazardous Air Pollutants \(HAP's\)](#)

An air pollutant to which no ambient air quality standard is applicable and which causes or contributes to an increase in serious irreversible or incapacitating reversible illness.

They are commonly defined as those pollutants that [are known or suspected of causing cancer](#) or other [serious health effects such as birth defects or developmental effects](#).

Environmental Regulations – Laws and Regulations

Clean Water Act (CWA)



Environmental Regulations – Laws and Regulations

Clean Water Act (CWA)

Objective is to improve and maintain water quality by restoring the physical, chemical and biological integrity of the nation waters.

CWA comprises of five elements

- ① A system of minimum national effluent standards for each industry
- ② Water quality standards
- ③ A discharge permit program that translates these standards into enforceable limits
- ④ Provisions for special wastes such as toxic chemicals and oil spills
- ⑤ A program for publically owned treatment works

Environmental Regulations – Laws and Regulations



Environmental Regulations – Laws and Regulations

Other acts related to water

- Oil Pollution Act
- Safe Drinking Water Act (SDWA)

Oil Pollution Act

- Objective is to prevent the oil spills which can cause great environmental and economic damage.
- Environmental Protection Agency (EPA) requires owners and operators of certain facilities that drill, produce, gather, store, process, refine, transfer, distribute or consume oil to prepare and implement spill prevention and control measures.

Environmental Regulations – Laws and Regulations



Environmental Regulations – Laws and Regulations

EPA also enforces the oil spill liability and penalty provisions under the act.

EPA also provides incentives to owners in prevention and control of oil spills.

Safe Drinking Water Act (SDWA)

- To prevent the **underground injections of contaminated fluids** that would endanger drinking water sources.
- It also covers **water quality at all public water systems**.
- The law defines public water system as a water supply system that provides water for **human consumption through pipe lines**.

This includes essentially all workplaces, hospitals, and camp grounds.

Environmental Regulations – Laws and Regulations



Environmental Regulations – Laws and Regulations

Laws Pertaining to Hazardous Materials and Water

- Toxic substances control act
- Resource conservation and recovery act

Toxic substances act

- To protect public health and environment from toxic substances emissions
- Under this act, EPA has the power to obtain information on all new and existing chemical substances and to control any of the toxic substances determined to cause an unreasonable risk to public health or environment.
- Prior to this act EPA could act to control a toxic substance only after the realization of effect. There were no provisions for prescreening chemicals before they enter into the market place.

Environmental Regulations – Laws and Regulations

- Now all the new chemicals must be evaluated before they are manufactured for commercial purposes.
- Any company planning to manufacture or import a new chemical must first submit a pre-manufacture notification to EPA which contains information on the identity, use, anticipated production volume, workplace hazards and disposal characteristics of the substance.
- The manufacturer should also conduct a toxicological test and report to EPA.

Environmental Regulations – Laws and Regulations

- Resource conservation and recovery act (RCRA)



Environmental Regulations – Laws and Regulations

- Resource conservation and recovery act (RCRA)
- To achieve environmentally sound management of both hazardous and non-hazardous wastes.
- Materials from point of origin to their point of ultimate disposal and beyond
- This came to be known as the cradle-to-grave concept.
- This act also promotes resource recovery to reduce the generation of both hazardous and non-hazardous wastes.

Environmental Regulations – Laws and Regulations

- Resource conservation and recovery act (RCRA)
- RCRA defines “hazardous waste” as a solid waste because of the quantity, concentration, or physical, chemical or infectious characteristics which may cause or significantly contribute to increase in serious illness to human health or environment when improperly treated, stored or disposed off.

Environmental Regulations – Laws and Regulations

- Resource conservation and recovery act (RCRA)
- EPA designated 4 characteristics of a hazardous waste
 - (i) Ignitability
 - (ii) Reactivity
 - (iii) Corrosivity
 - (iv) Toxicity

Environmental Regulations – Laws and Regulations

- Resource conservation and recovery act (RCRA)

- (i) Ignitability

- Waste those catch fire under certain circumstances, such as some paints and many degreasers (house hold cleaners) and solvents.

- (ii) Corrosive waste

- Corrode metals or have a very high or low pH (e.g.) rust removers, alkaline or acid cleaning agents and battery

- (iii) Reactive waste

- Reactive waste those that are unstable and explode or produce toxic fumes, gases and vapors when with water or under other conditions such as heat or pressure (e.g.) sulfur bearing wastes.

Environmental Regulations – Laws and Regulations

- Occupational Safety and Health Act (OSHA)
- Late 1960's and early 1970's there was an awakening not only on the need to uniformly protect the health and the environment, but also a need to monitor the workplace conditions in order to improve worker health and well being.
- In a sense, there was a desire to improve the indoor environment in the workplace.
- There was economic incentives because of the personal injuries and illness arising out of workplace situations that impose a substantial burden: cost production, wage loss, medical expenses and disability compensation payments.
- Therefore, the intent of OSHA is to ensure safe and healthful working conditions for working men and women by enforcing standards.

Environmental Regulations – *References*

Paul L. Bishop (2000) Pollution Prevention Fundamentals and Practice, Mc. Graw Hill.