

Chapter-Two Construction Hazard Solutions

Hazardous waste management and pollution control:

The most common methods of pollution control are source reduction and recycling. Waste treatment and disposal are not classed as components of construction pollution prevention program, although they should be considered for inclusion within the scope of the environmental section of the site's Safety Plan.

The hierarchy of waste management is a set of stepped alternatives which provides guidance on best practice in minimizing or preventing the generation of waste materials. It also applies to pollution in general:

- Waste should be **prevented or reduced** at the source by designing out whenever feasible
- Waste that **cannot be prevented or reduced** should be **reused whenever feasible**
- Waste that **cannot be prevented, reduced or reused** should **be recycled in an environmentally safe and friendly manner**, whenever feasible
- **Disposal, landfill or other Release** into the environment should be used only as a last resort, and should be carried out in an **environmentally safe and friendly manner**

Source reduction: is any method or technique **used at or before the point of generation** that **reduces or eliminates the creation or use of hazardous substances** or all controlled wastes so as to reduce the risks to health and the environment.

Source reduction can be achieved through:

- Improvements in housekeeping
- Better and more frequent preventive maintenance
- Upgrading storage and materials handling techniques
- Discussion with, and eventually approving selected suppliers, to encourage their environmental efforts
- Substitution of chemicals
- Improved worker training

Recycling: is the process of using or reusing a material or residual component of a material. **It aims to minimize waste**, and can also be achieved through reclamation, which is the process of treating a material to recover a usable product.

Examples use and reuse of suitable demolition products for both projects and offices.

Air pollution control: Involves limiting the emission of pollutants into the atmosphere. Six major air pollutants generally recognized as significant are: Carbon monoxide, Ozone, Sulphur oxides, Nitrogen dioxide, Particulate matter and Lead.

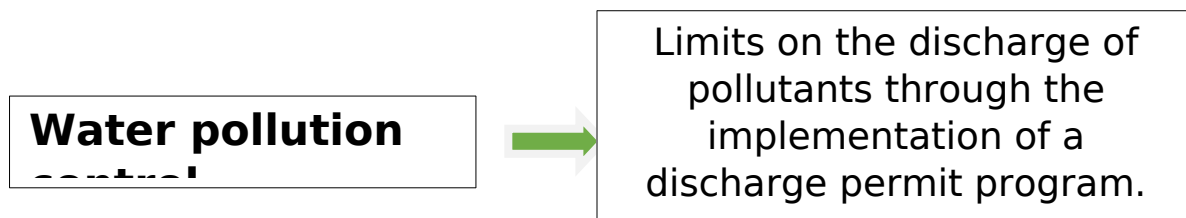
There are also air emission standards for friable asbestos during a number of activities including:

- Building renovation and demolition
- Asbestos removal and encapsulation
- The disposal of asbestos and asbestos-containing materials.

Other potentially significant pollution sources include the use and maintenance of motor vehicles and releases from stationary sources such as boilers, furnaces and the burning of waste.

Water pollution control

Water pollution control is concerned with the restoration and maintenance of the chemical, physical and biological integrity of water resources.



For both sites and offices, water pollution goals can be met by working towards the following:

- **Identification** of all substances used by contractors in their work and the provision which includes the **means of disposal** and containment of spillages where appropriate
- **Prompt identification** of the nature of any effluent from contractors' work areas, which must neither be harmful nor cause deposits or contamination in drains and sewers

There may also be standards for non-domestic sources which discharge into sewers leading to publicly-owned treatment works; these may incorporate

- pH,
- Temperature,

- Flammable materials and
- Pretreatment requirements
 - A requirement for a spillage control and countermeasure plan to minimize the risk of oil spills.
 - A requirement for storm water permits for certain types of industrial facilities or processes

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A. Types of wastes

There are many possible definitions of 'hazardous waste', but the term 'hazardous waste' normally applies to any mixture containing a hazardous waste, usually includes any **solid, liquid or contained gas** which is either **ignitable, corrosive, reactive or toxic** (or any combination of these) and which is at the end of its useful life.

Common exclusions from the definition of hazardous waste are:

- Material such as domestic sewage
- Any mixture approved for discharge through a sewage system for treatment in a sewage works
- Some industrial wastewater point source discharges
- Waste controlled under other more specific laws (common examples are lead and asbestos)
- Some wastes destined for recycling and
- Some kinds of empty container

Ignitable

Hazardous wastes are those which have the ability to cause a fire during transport, storage or disposal. Examples include waste oils, used solvents and oxidizers.

Corrosive

Hazardous wastes are those able to deteriorate standard containers, damage human tissue and/or dissolve toxic components of other wastes. Strong acids and alkalis are examples.

Reactive

Hazardous wastes have the tendency to become chemically unstable during normal conditions, or **to react violently when exposed to air or mixed with water**, or to generate toxic gases.

Examples include some compounds of phosphor, pure sodium, and sulphuric acid in storage batteries. Although these are unlikely to be produced by the construction process, they can be found during demolition.

Toxic

Hazardous wastes have the potential to leach from landfills and contaminate soil and groundwater. Some common examples are lead, benzene, carbon tetra-chloride, mercury and cadmium.

B. Hierarchies of Hazard control

There are many hazardous substances which are commonly used or produced at work. There are also activities/jobs that are hazardous by nature such as elevated works, excavation, confined space works etc.

Examples hazardous substances:

- Solvents in glues and paints,
- Silica dust produced during grinding and chasing
- Concrete on site and
- Fixative agents used in enclosed office areas.

These substances and jobs should be identified and their risks assessed.

- Unless a particular hazard is removed, the risk associated with such a hazard can never be completely eliminated.

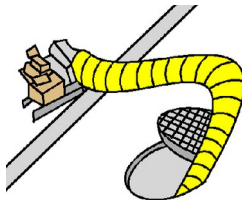
- The approach most commonly used is referred to as the hierarchy of controls, from preferred to least desirable, as follows:
 - a. elimination
 - b. substitution
 - c. engineering controls
 - d. administrative (procedural) controls; and
 - e. Personal protective equipment (PPE).

ENGINEERING CONTROLS - engineered safeguards to:

1. protect employees
2. prevent exposure to hazards

Examples: machine guards, safety controls, isolation of hazardous areas, monitoring devices

- **Hazard Elimination**
- **Add-On Safety**
- **“Active” vs.**
- **User Instructions**



Ventilation
Design/Layout
Safety Devices

The first cardinal rule of hazard control (safe design) is "hazard elimination" or "inherent safety." That is, if practical, one should control (eliminate or minimize) potential hazards by designing them out of products and facilities "on the drawing board." This is accomplished through the use of such interrelated techniques as "hazard removal, hazard substitution, and/or hazard attenuation," through the use of the principles and techniques of system and product safety engineering, system and product safety management, and human factors engineering, beginning with the concept and initial planning stages of the system design process.

The second cardinal rule of hazard control (safe design) is the minimization of system hazards through the use of add-on "safety devices" or "safety features" engineered or designed into products or facilities "on the drawing board" to prevent the exposure of product or facility users to inherent potential hazards or dangerous combinations of hazards; called "extrinsic safety." A sample of such devices would include shields or barriers that guard or enclose hazards, component interlocks, pressure relief valves, stairway handrails, and passive vehicle occupant restraint and crashworthiness systems.

Passive vs. Active Hazard Controls. A principle that applies equally to the first two cardinal rules of safe design is that of "passive vs. active" hazard control. Simply, a passive control is a control that works without requiring the continuous or periodic involvement or action of system users. An active control, in contrast, requires the system operator or user to "do something" before system use, continuously or periodically during system operation in order for the control to work and avoid injury. Passive controls are "automatic" controls, whereas active controls can be thought of as "manual" controls. Passive controls are unquestionably more effective than active controls.

The third cardinal rule of hazard control (safe design) is the control of hazards through the development of warnings and instructions; that is, through the development and effective communication of safe system use (and maintenance) methods and procedures that first warn persons of the associated system dangers that may potentially be encountered under reasonably foreseeable conditions of system use, misuse, or service, and then instruct them regarding the precise steps that must be followed to cope with or avoid such dangers.

Third approach must only be used after all reasonably feasible design and safeguarding opportunities (first and second rule applications) have been exhausted.

Further, it must be recognized that the (attempted) control of system hazards through the use of warnings and instructions, the least effective method of hazard control, requires the development of a variety of state-of-the-art communication methods and materials to assure that such warnings and instructions are received and understood by system users.

Among other things, the methods and materials used to communicate required safe use or operating methods and procedures must give adequate attention to the nature and potential severity of the hazards involved, as well as reasonably anticipated user capabilities and limitations (human factors).

ADMINISTRATIVE CONTROLS - use of procedures to

1. Monitor safe practices and environments
2. Identify & correct new hazards
3. Safety Committee

Examples: periodic inspections, equipment operating procedures , maintenance procedures, JHA

Administrative activities also consider

- Safety Rules
- Disciplinary Policy - Accountability
- Preventative Maintenance
- Training
- Proficiency/Knowledge Demonstrations