**HAZARDOUS WASTES**

**RCRA** of 1976:

* + **Defines hazardous waste**
  + Promotes recovery and conservation
  + Mandates government control of ultimate disposal from point of generation to point of disposal (**cradle-to-grave** concept)
  + Requires manifest identification and permitting system
  + **Amended to require double liners and leachate collection system**
  + **Applies to generators producing at least 220 lb. in a calendar month**

**CERCLA** of 1980, amended in 1986:

* + Defines hazardous substances as used in the Clean Air Act and Clean Water Act
  + Regulates leachate and other releases from abandoned and inactive sites operating prior to November 1980
  + Businesses that produce 220–2,000 lb of hazardous wastes in a calendar month are also regulated
  + Comes into play when hazardous waste sites are identified and classified
  + Established priorities list of sites targeted for remediation (bad first)
  + Gov’t can require owner/operator to clean up site
  + Established “**Superfund**” via tax on chemical production
  + If responsible party cannot be found, gov’t can perform clean up with state contribution of 10% of cleanup cost

Superfund Amendments and Reauthorization Act (SARA) of 1986:

* + First mandatory gov’t program requiring chemical emergency planning at the state and local level
  + Extension of CERCLA that established remediation standards and increased funding to implement the program
  + **Title III of SARA:**
    - Emergency Planning and Community Right to Know Act (**EPCRA**) established
    - Provides public with knowledge about chemical hazards in their area

Toxic Substances Control Act of 1976:

* + Regulates production, use, and disposal of chemical substances that may present an unreasonable risk of injury to health or environment

Clean Air Act (EPA):

* + Regulates emission of hazardous air pollutants

Clean Water Act (EPA):

* + Regulates discharge of hazardous pollutants into the nation’s waters

Marine Protection, Research, and Sanctuaries Act (EPA):

* + Regulates waste disposal at sea

Occupational Safety and Health Act (OSHA):

* + Regulates hazards in the work place, including worker exposure to hazardous substances
  + Requires toxic waste operators to have 40 hours of training and protective equipment (**HAZWOPER**)

Hazardous Materials Transportation Act (DOT):

* + Regulates transportation of hazardous materials

Hazardous waste defined:

Solid waste or combination of solid wastes that because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

* + Cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness
  + Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of or otherwise managed

**Includes the following substances:**

* + **Chemical**
  + **Biological**
  + **Flammable**
  + **Explosive**
  + **Radioactive**

**Characteristics:**

* + **Ignitability**
  + **Corrosivity**
  + **Reactivity/explosiveness**
  + **Toxicity** (identified via toxicity characteristics leaching procedure, **TCLP**)

Hazardous waste recycling information required:

* + Company ID code
  + Category
  + Primary usable constituents
  + Contaminants
  + Physical state
  + Quantity
  + Packaging
  + Geographic location

Transportation:

* + **CHEMTREC** offers info and advice on what to do and on characteristics of chemicals in an emergency…available 24 hours a day, 365 days a year
  + In case of fire or other emergency at a facility having hazardous materials, info can be obtained via the National Oceanic and Atmospheric Administration (**NOAA**)
  + Information availability is required by the Superfund Amendments and Reauthorizatin Act (**SARA**)

Long-term storage:

* + **Double liners with leachate collection systems required**
  + **Groundwater monitoring system required**
  + **Can be assumed that all liners, cutoff walls, or other containments will eventually leak**

Manifest system:

* + Links generator, transporters, storage facilities, treatment plants, disposal sites, and the EPA/state
  + If incident occurs, hazards/risks can be recognized and responsible parties identified

Shipping (all on hazardous waste manifest):

* + Proper shipping name
    - Chemical name
    - Chemical group/family
    - End use
    - Hazard class
  + UN/NA Number
  + Hazard class (DOT)
    - Explosives
    - Gases
    - Flammable and combustible liquids
    - Flammable solids
    - Oxidizers
    - Poisonous, toxic, and infectious liquids/solids
    - Radioactive
    - Corrosive
    - Miscellaneous
  + Packing group
    - I = Great danger
    - II = Medium
    - III = Minor
  + Markings labels and placards
    - Orientation arrows
    - Hazardous waste label (and enter required waste and DOT markings on label)
    - Hazard label (DOT) and place primary hazard DOT label next to waste label
  + Additional information (handling)

Treatment technologies:

* + Physical
  + Chemical
  + Biological
  + Thermal
* g/ppm = density of vapor for HAZWOPER
* Hazardous materials drained from crank case = heavy metals, oil
* Process modification = zero tolerance for hazardous waste
* **Corrosion-resistant container = best for storing hazardous waste**
* Radioactive waste management = DOE (Dept. of Energy)
* **Storage of hazardous waste without permit = 90 days max**