**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**