



LAW OF TOXICS

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WHY REGULATE TOXICS?

- Protect environment
- Protect ecology
- Prevent disease

Chemicals are needed for food production, producing plastics, medicines and other products and to power machinery.



ENVIRONMENT

Toxins can have dramatic effects unintended consequences on the environment. Example:

- Herbicide, pesticide and other chemical runoff do not just kill plants and animals in a yard or field, but will also kill marine life throughout a reef.
- Fertilizer runoff from urban lawns, golf courses and agricultural fields, as well as domestic sewage, are common sources of nutrients from land-based activities. These nutrients can encourage rapid growth of algae that crowd out corals and kill reefs.

PREVENT DISEASE (Toxicology)

- Paracelsus -- "All things are poison and nothing is without poison, only the dose permits something not to be poisonous."
- Toxicology part of Risk Assessment.
- Example: H₂O



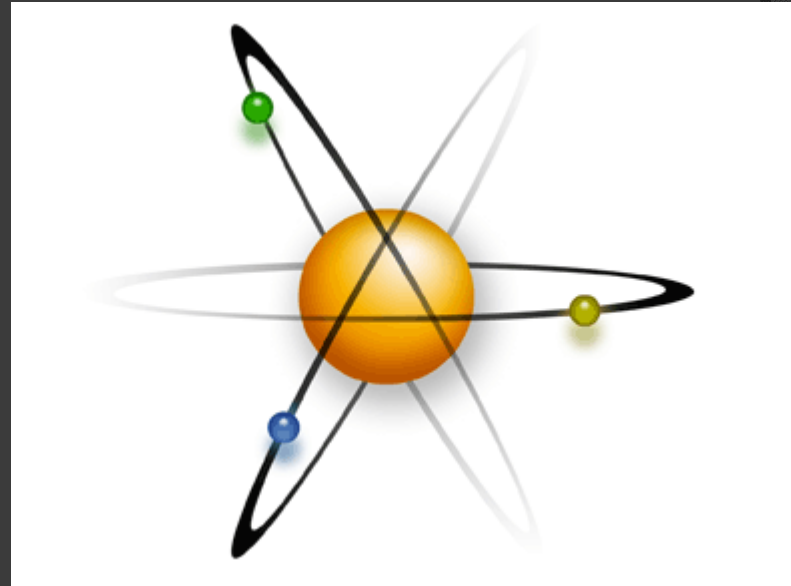
REGULATION OF TOXICS INVOLVES MANY EARTH SCIENCES

- ⦿ Toxicology
- ⦿ Chemistry
- ⦿ Geology
- ⦿ Physics
- ⦿ Hydrology

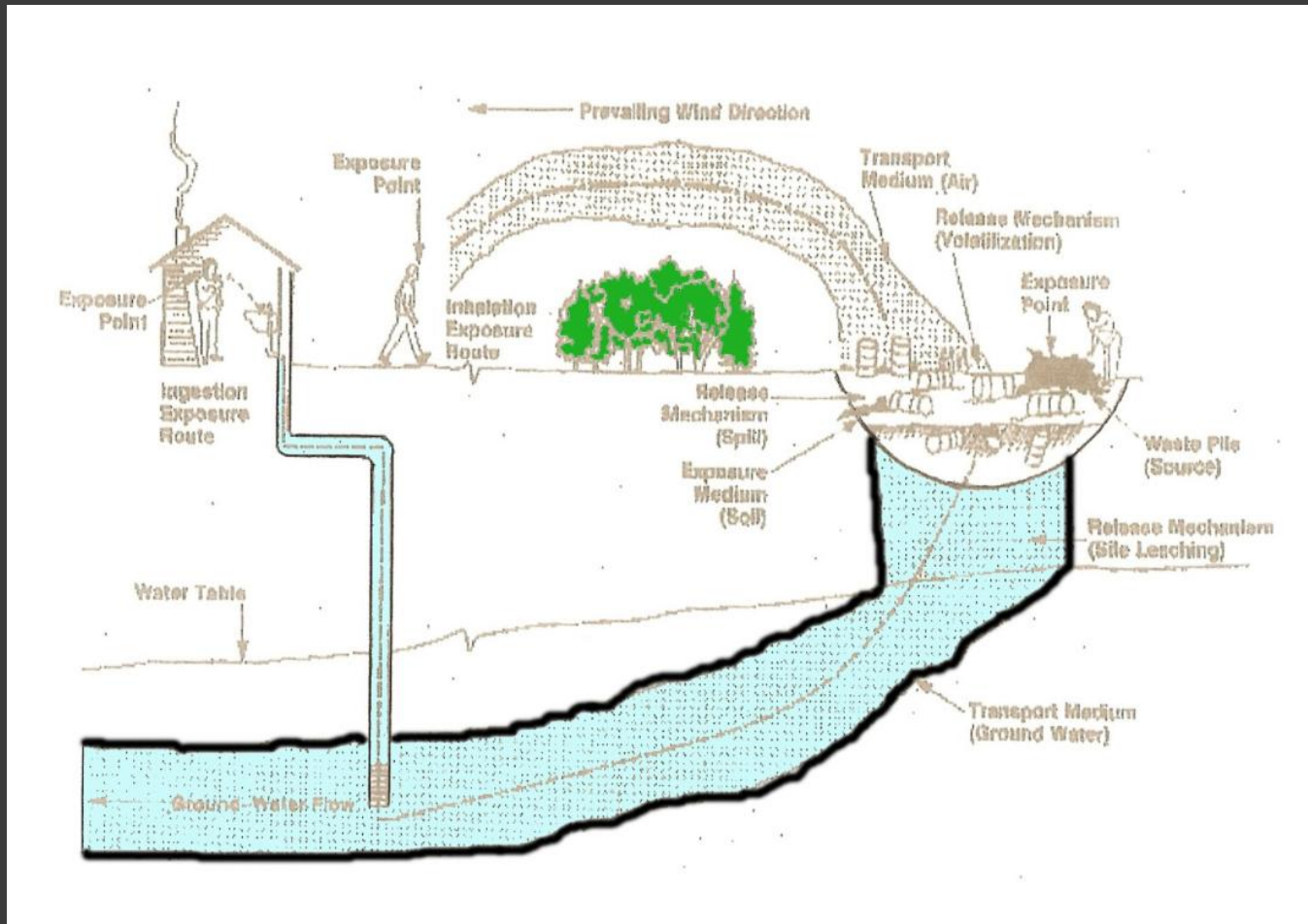


CHEMICALS OF CONCERN AND THEIR PROPERTIES

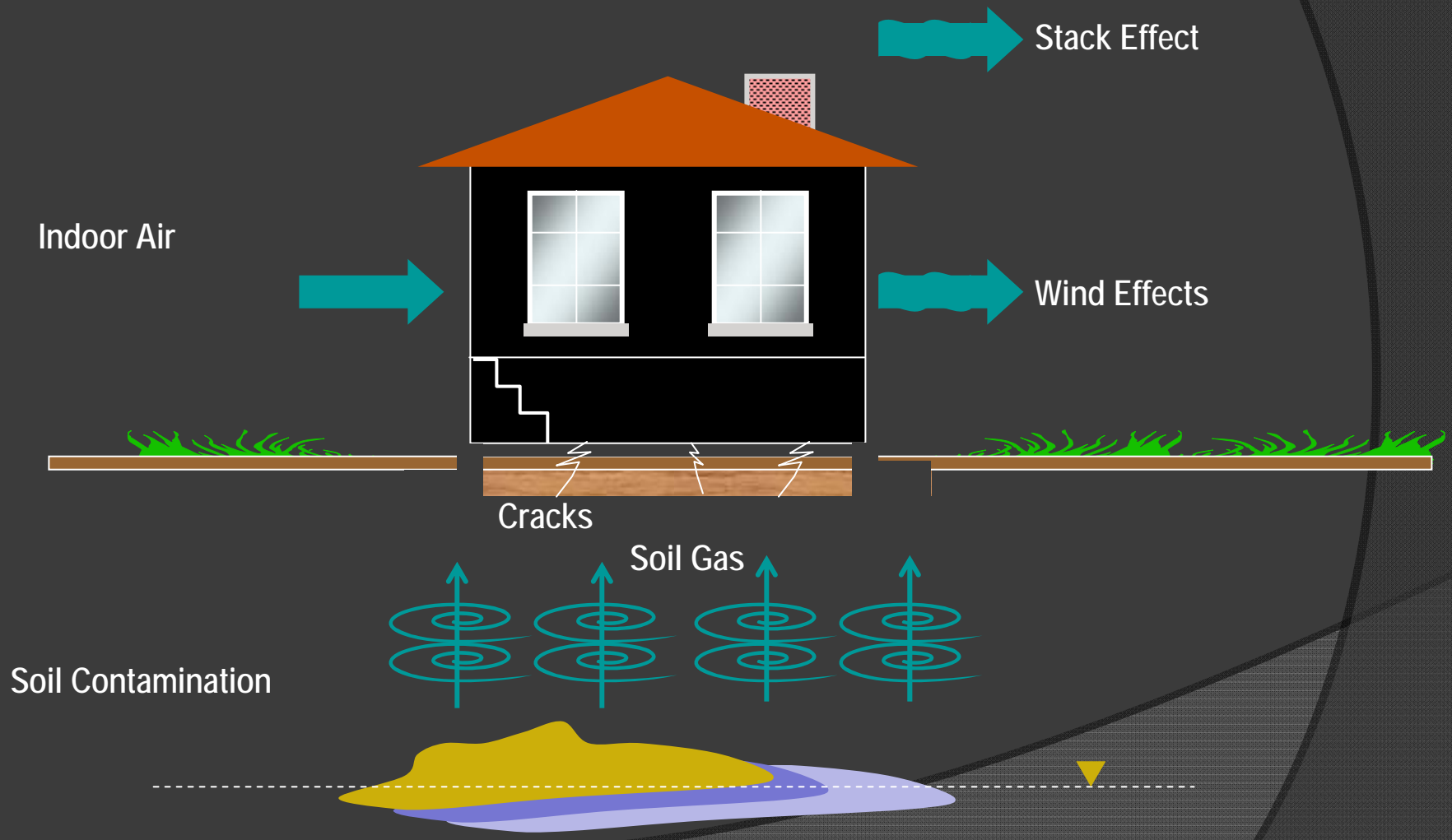
- A basic understanding of the properties of environmentally significant chemicals and how they move through the environment is necessary to understand the law regarding the regulation of Toxics.
- The fundamental properties of the chemicals are the root of fate, transport and remediation processes in the environment.



Transport & Exposure

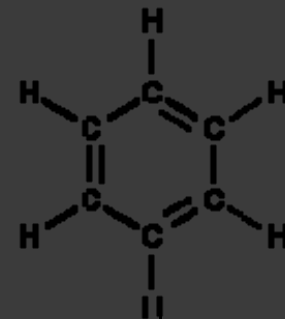


Vapor Pathway



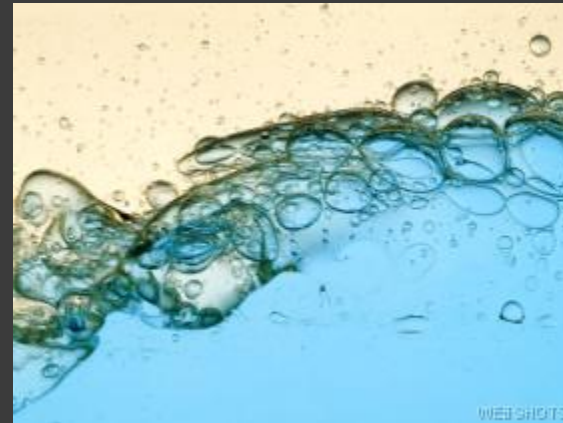
Families of Chemicals

- Volatile Organic Compounds
- Semi-volatile Organic Compounds
- Metals
- Inorganic Chemicals



The Environmental Significance of Chemical's Physical Properties

- Solubility
- Vapor Pressure
- Specific Gravity
- Viscosity
- Polarity
- Partitioning
- Volatility



Properties of Volatile Organic Compounds (VOCs)

- **Volatility.**
Volatile organic compounds have relatively high volatility. Most will readily evaporate at ambient temperatures.
- **Solubility in Water.**
Volatile organic compounds of environmental significance range from having very low solubility in water being miscible with water. Those that are soluble migrate with the flow of water, making them particularly troublesome in the environment. (e.g. **Methol Teritary Butyl Ether**) Even volatile organics with low solubility are frequently detected in water samples, because their high vapor pressures and low viscosity permit them to migrate readily into surface waters and/or groundwater.
- **Vapor Pressure.**
Volatile organic compounds of environmental significance have high vapor pressure compared to Semi-Volatile organic compounds. Because of their high vapor pressures, these compounds are frequently detected in liquid, solid and air samples. Volatile Organic compounds tend to evaporate from the solid and liquid environment to the atmosphere, particularly in conditions of high temperature, high wind or extremes in atmospheric pressure (such as vapor extraction or air stripping remediation).
- **Specific Gravity.**
Assuming low solubility, Volatile compounds with a specific gravity greater than water sink, compounds with a specific gravity less than water float. **Dense Non-Aqueous Phase Liquids (DNAPLs)** are called “sinkers” and **Light Non-Aqueous Phase Liquids (LNAPLs)** are called “floaters”.
- **Viscosity.**
In general, Volatile organic compounds have lower molecular weights and lower viscosity than semi-volatile organic compounds of environmental significance. This contributes to the tendency of volatile compounds to readily migrate in the environment.
- **Partitioning.**
Volatile organic compounds vary in degree to which they have an affinity for either the organic environment or the aqueous environment. Those which have an affinity for the organic environment (biota, sediment and soil) can adsorp to the surface of soil and sediment particles.

Properties of Semi-Volatile Organic Compounds

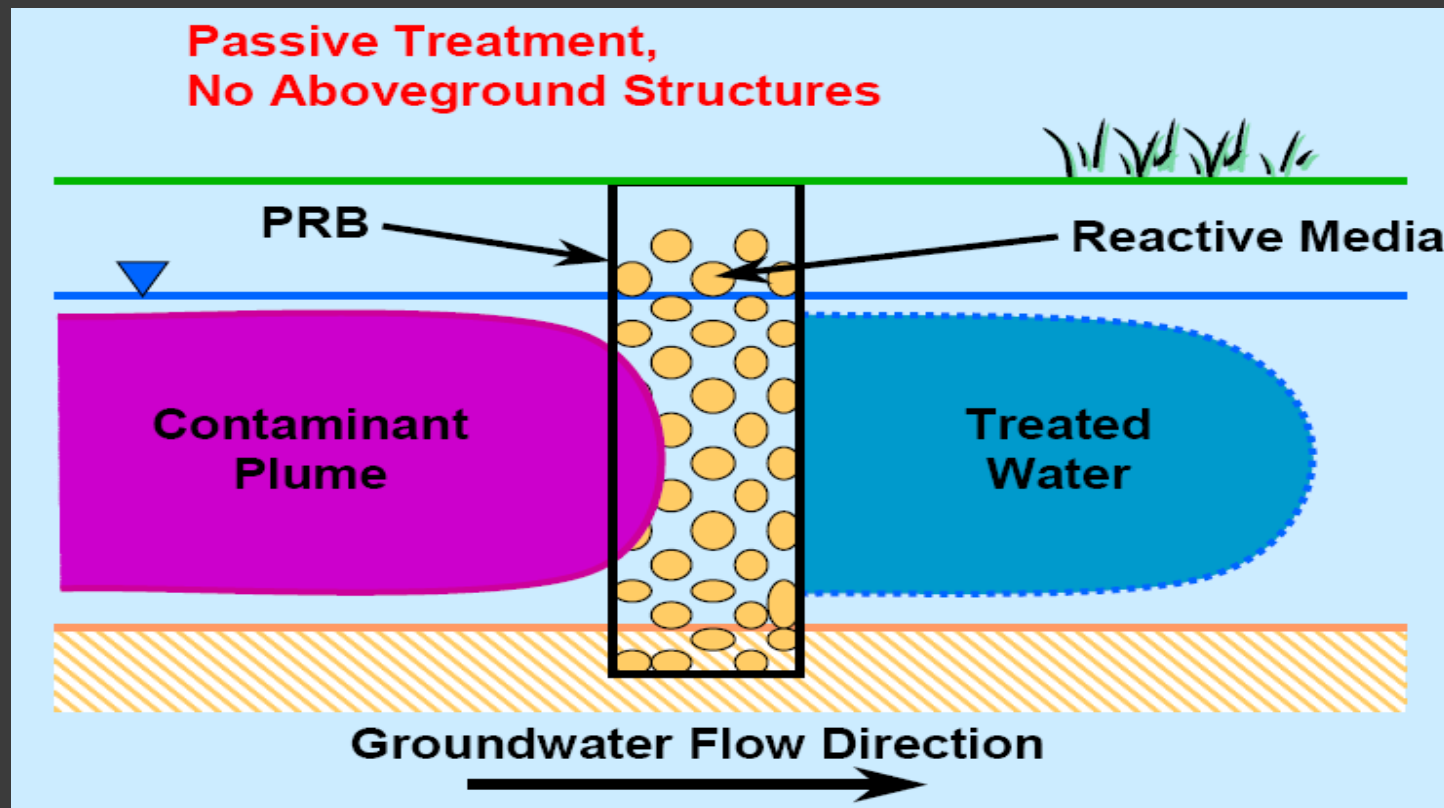
- ◉ **Volatility.**
Semi-volatile organic compounds have relatively low volatility. They do not evaporate readily at ambient temperatures.
- ◉ **Solubility in Water.**
Most Semi-Volatile organic compounds of environmental significance have low solubility in water. These compounds do not tend to migrate with the flow of water and are infrequently detected in water samples. When detected in water samples, semi-volatile compounds are usually adsorbed to particulate matter in the sample or are present in a separate liquid phase that is co-analyzed with the water phase.
- ◉ **Vapor Pressure.**
Semi-Volatile organic compounds of environmental significance have low vapor pressure compared to Volatile organic compounds. Because of their low vapor pressures, (and low solubility) these compounds are usually detected in solid samples such as biota, soil, or waste materials.
- ◉ **Specific Gravity.**
Assuming low solubility, Semi-Volatile compounds with a specific gravity greater than water sink, compounds with a specific gravity less than water float. **Dense Non-Aqueous Phase Liquids (DNAPLs)** are called “sinkers” and **Light Non-Aqueous Phase Liquids (LNAPLs)** are called “floaters”.
- ◉ **Viscosity.**
In general, the Semi-Volatile organic compounds have higher molecular weights and a higher viscosity than volatile organic compounds of environmental significance. This contributes to the tendency of semi-volatile compounds to migrate more slowly in the environment.
- ◉ **Partitioning.**
Many Semi-Volatile organic compounds tend to partition into the organic phase of the environment. Pesticides and Herbicides are semi-volatile chemicals that are designed to partition into biota.

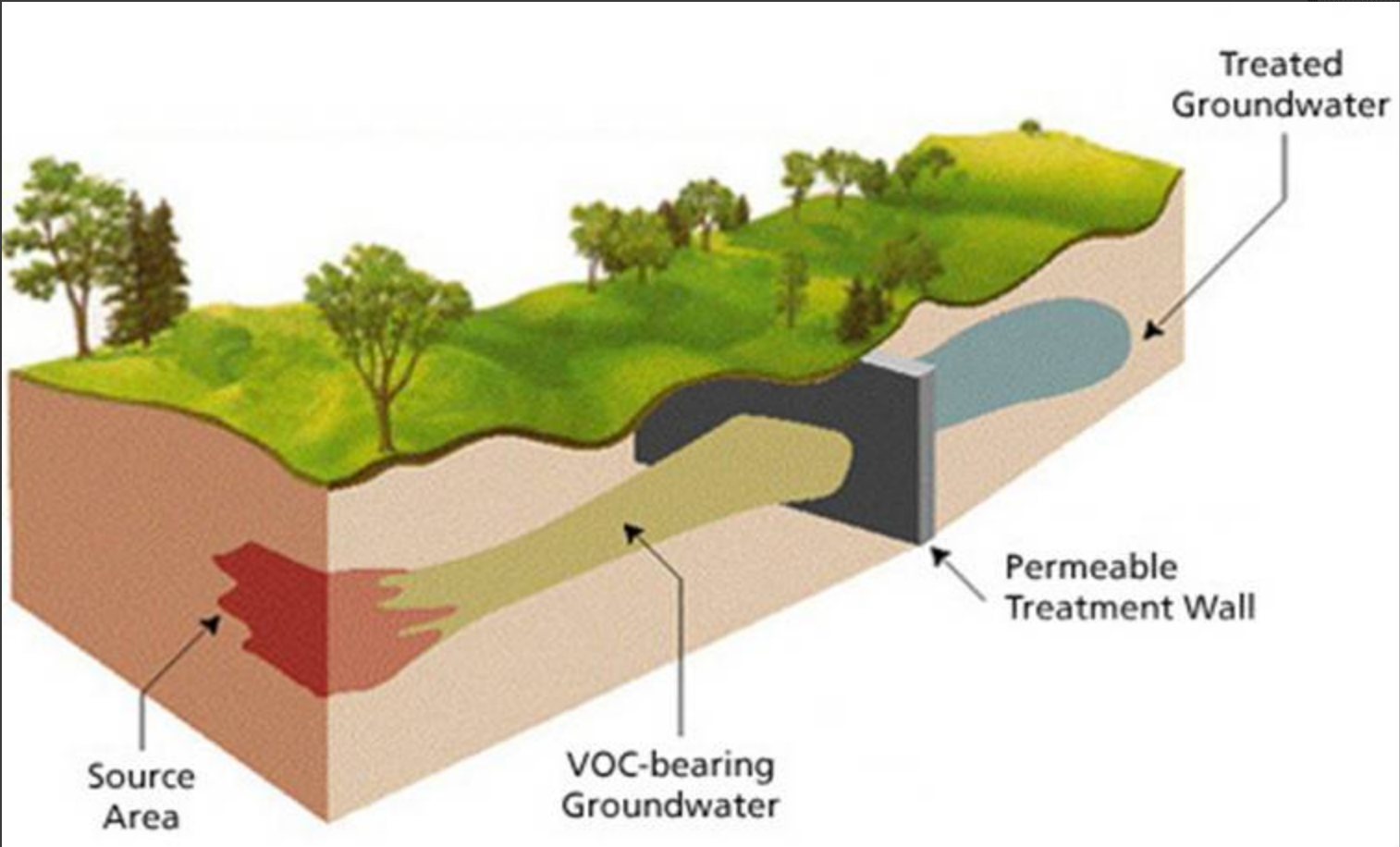
Properties of Metals

Metals are used to build tools, machines and microprocessors. Some metals are essential micro-nutrients for plants and animals, some are toxic and some metals are both nutrients and toxic depending on concentration and form.

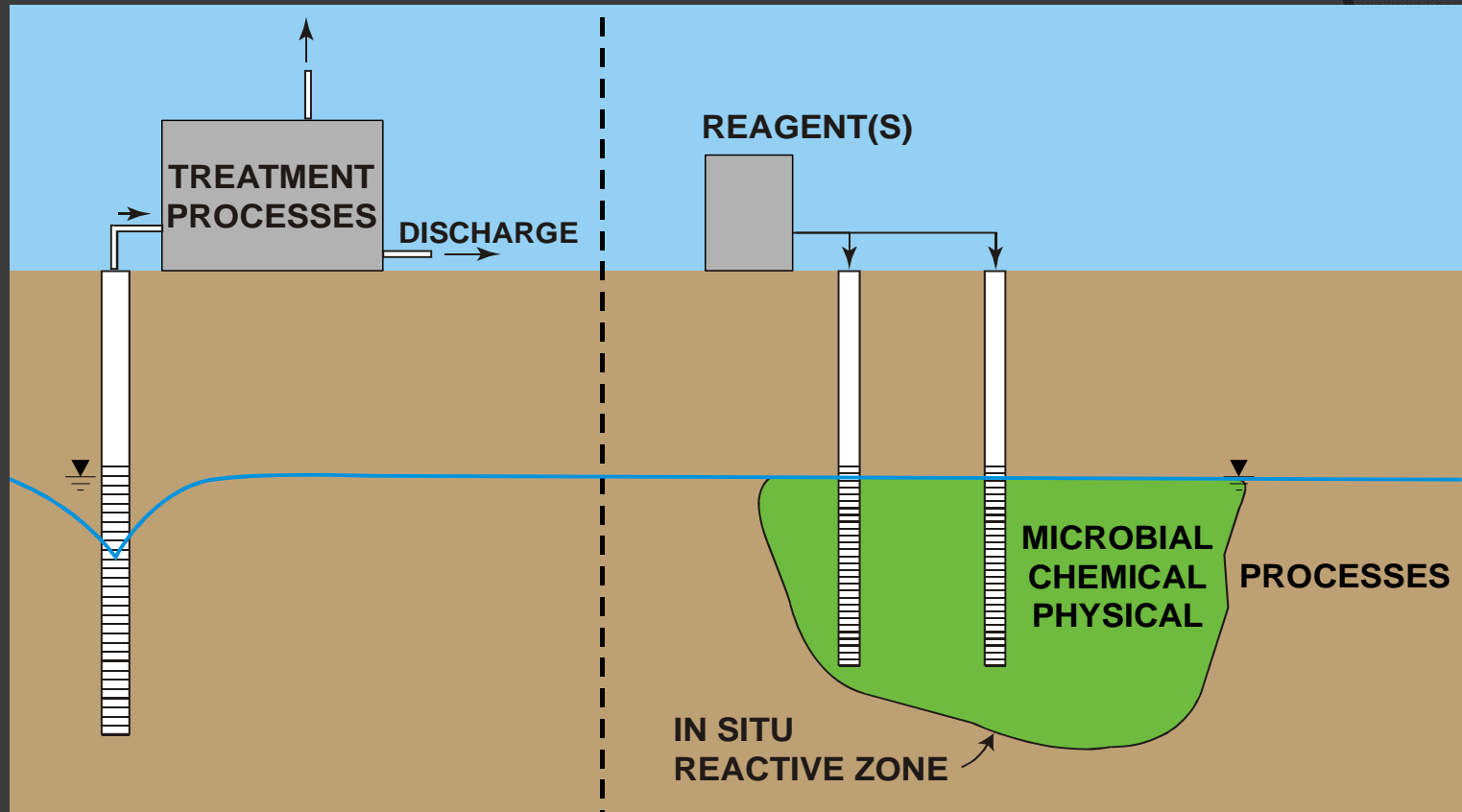
- **Volatility.**
Metals are considered non-volatile from the environmental pollution perspective.
- **Solubility in Water.**
The solubility of metals in water is highly dependent on the pH of the system and the valence state of metal. Generally, metals have high solubility in waters with low pH, low solubility in waters with high pH. Water samples are preserved with acid to reduce the pH below 2 in order to keep the materials in solution. In high pH systems, metals tend to either precipitate or adsorb to a negatively charged surface.
- **Vapor Pressure.**
For the metals, vapor pressure is a factor only for Mercury. Mercury has a low vapor pressure and will evaporate at ambient temperatures.
- **Specific Gravity.**
Specific Gravity of metals is environmentally significant during the remediation of metallic forms of some metals. For example, the high specific gravity of metallic lead can be exploited to separate it from soil by washing the soil with water. (This is the same process used to pan for gold).
- **Partitioning.**
Partitioning of metals is a very complex process dependant upon pH, presence of organic matter and redox potential of the environmental system. The form of metal also has an important role in solubility. For example, ferric (Fe+3) is insoluble in water however ferrous iron (Fe+2) is soluble in water. Therefore, the insoluble ferric iron tends to partition into a solid phase of the environment while the soluble ferrous iron tends to partition into the liquid phase of the environment and into biota.
- **Reduction/Oxidation Potential (Redox Potential).**
Redox potential is a property of an environmental system, not an individual metal, however it is included under "properties" because it is important in describing the environmental behavior of metals. When metals gain or lose electrons in a chemical reaction, the process is referred to as a redox reaction. A redox reaction results in a change to the valence of metal. The reaction component that gains electrons is *reduced*, the component that loses electrons is *oxidized*. (*memory device*: think of the valence number being reduced mathematically, e.g. Fe+3 is *reduced* to Fe+2)

Traditional and Innovative Cleanup Technologies





Pump & Treat/Ex-Situ Vs. In-Situ Processes



KEY FEDERAL LAWS RELATED TO TOXICS

- **Toxic Substance Control Act**
15 U.S.C. §§ 2601 et seq.
- **Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)**
42 U.S.C. §§ 9601 et seq.
- **Resource, Conservation and Recovery Act of 1976**
42 U.S.C. § 6901 et seq.
- **Federal Insecticide, Fungicide & Rodenticide Act**
7 U.S.C. § 136, 40 C.F.R. § 150
- **Hazardous Materials Transportation – 2 laws**
 - Hazardous Materials Transportation Authorization Act
 - RCRA
 - States to adopt consistent laws

KEY FEDERAL LAWS RELATED TO TOXICS

- **Clean Water Act**
33 U.S.C. §§ 1251 et seq.
- **Clean Air Act**
42 U.S.C. §§ 7401 et seq.
- **Oil Pollution Act**
33 U.S.C. §§ 2701 et seq.
- **Occupational Safety and Health Act**
The Act is encoded at 29 U.S.C. §§ 651-678. Regulations adopted pursuant to the Act are located at 29 C.F.R. §§ 1902.1-1990.152.
- **Safe Drinking Water Act**
42 U.S.C. § 300j-8 (1982).
- **National Environmental Policy Act**
42 U.S.C. §§ 4321 et seq.

TOXIC SUBSTANCE CONTROL ACT

15 U.S.C. §§ 2601 et seq.

- Collect information on existing chemicals
- Screen new chemicals
- Test chemicals
- Control chemicals posing “unreasonable risk”



TSCA

Existing Chemicals

- ⦿ EPA establish inventory as of 8/80
- ⦿ New substances added through premature manufacture notification and review.
- ⦿ Manufactures provide data:
 - **Production, use by products**
 - **Human exposure**
 - **Health and Safety effects studies**

TSCA

New Information On Existing Chemicals

- Manufacturers/distributors/processors of substances
 - Keep records of allegations of “significant adverse reactions”
 - Excludes known human health effects
 - Employee reactions kept for 30 years
 - 5 year retention for others
 - Firms must establish procedure for prompt reporting
 - Corporate officers can be held personally liable

TSCA

New Information On Existing Chemicals

- Manufacturers/distributors/processors of substances
 - Must report information that “reasonably supports conclusion” that the chemical used presents substantial risk of injury to health or environment.
- Must establish procedure for prompt reporting;
- Corporate officers can be personally liable;

TSCA CHEMICAL TESTING

- EPA may require testing of chemicals that may pose an unreasonable risk and more data needed to evaluate.
- EPA adopts a testing rule.
- All manufacturers share costs.

TSCA CHEMICAL CONTROLS

- EPA can ban or control chemicals found to pose unreasonable risk of injury:
 - can bar or limit manufacturing or uses
 - impose labeling requirements
 - regulate disposal

PCB REGULATIONS UNDER TSCA

- 1976 Statutory edict to phase out
- 1978 Ban except when totally enclosed
- 1979 Manufacturing banned
- 1979 Distribution banned
- EPA can exempt from bill if it would not present an unreasonable risk of injury
- Disposal regulated by EPA > 50 ppm

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA)

- Enacted 1980 in response to Love Canal Incident
- 42 U.S.C. §§ 9601 et seq.
- Amended (SARA – 1986)
- Amended (Secured Creditor Exemption – 1996)
- Amended (SBLRA – 2002)

CERCLA – Legal Elements

CERCLA addresses the clean up and apportionment of liability at hazardous waste sites. Legal elements:

- Release into environment
- From facility
- Resulting in response costs
- By a responsible party

NATURE OF CERCLA LIABILITY

- ⦿ Strict – without regard to fault or compliance with industry standards
- ⦿ Retroactive – imposes liability on incidents occurring before 1980!
- ⦿ Joint & several liability



CERCLA – Liability

- Owners
- Operators
- Arrangers
- Generators
- Transporters
- Innocent landowner
- Third party
- Contiguous landowner
- Petroleum exclusion
- Statute of limitations

Responsible Parties

Defenses

LEGAL REMEDIES

- Cost Recovery – Section 107, compliance with NCP.
- Injunctive Relief – Must prove irreparable harm & damages inadequate compensation.
- Contribution – Section 113, suit under 107.



Resource, Conservation and Recovery Act (RCRA)

- Enacted 1976 – Cradle to grave permitting and management of landfills.
- 42 U.S.C. §§ 6901 et seq.
- UST Amendments 1986 – response to CERCLA pollution exclusion.
- Amended 1996 – lender liability.

RCRA

- Creation of solid waste.
- Release into environment creating “imminent and substantial endangerment” to health/environment.
- By a responsible party.
- Who contributed to the contamination.
- Strict liability
- Not always retroactive (42 U.S.C. § 6972(a)(1)(B) but not § 6972(a)(1)(A)).
- Joint & severable

Elements

Nature of Liability

RCRA - liability

- Owners
- Operators
- Arrangers
- Generators
- Transporters
- Innocent landowner
- Third party
- Contiguous landowner
- Petroleum exclusion
- Statute of limitations

Responsible Parties

Defenses

RCRA

- ⦿ Injunctive relief
 - Need not prove irreparable harm
 - “imminent & substantial endangerment”
- ⦿ No cost recovery
- ⦿ No contribution
- ⦿ Private right of action
- ⦿ Reasonable attorneys fees are recoverable by private attorney general
- ⦿ No right to jury trial
- ⦿ Federal courts only

KEY CALIFORNIA LAWS

- **Hazardous Substance Account Act (HSAA);** Cal. Health & Safety Code §§ 25300 et seq.
- **Porter-Cologne Water Quality Control Act**
Cal. Water Code §§ 13000 et seq.
- **Hazardous Waste Control Law**
Cal. Health & Safety Code §§ 25100 et seq.
- **California Clean Air Act**
Cal. Health & Safety Code §§ 39000 et

KEY CALIFORNIA LAWS

- **California Environmental Quality Act**
Cal. Pub. Res. §§ 21000 et seq.
- **Safe Drinking Water and Toxic Enforcement Act (Prop 65)**
Cal. Health & Safety Code §§ 25249.5-25249.13

Hazardous Substance Account Act (Cal. Health & Safety Code §§ 25300 et seq.)

- Enacted in 1981 (1 year after CERCLA)
- Enacted to parallel CERCLA
- Purpose to clean up toxics site & reimburse government clean up costs
- Excludes most releases related to fertilizers and pesticides
- Does NOT apply to petroleum products

HSSA-CERCLA Comparison

- ⦿ Elements of claim = CERCLA
- ⦿ Nature of Liability = CERCLA but NOT retroactive
- ⦿ Persons Liable = CERCLA
- ⦿ Defenses = CERCLA
- ⦿ Private Attorney General = CERCLA
- ⦿ Non-recoverable attorneys' fees = CERCLA

HSSA-CERCLA Comparison

- ⦿ No Right to Jury Trial = CERCLA
- ⦿ Contribution & Indemnity Rights = CERCLA
- ⦿ Jurisdiction = Either State or Federal Courts

Hazardous Waste Control Law

(Cal. Health & Safety Code §§ 25100 et seq.)

- Enacted in 1972 (4 years prior to RCRA)
- RCRA enacted to parallel HCWL
- Purpose to clean up toxics site & reimburse government clean up costs
- Requires permits, manifests, notices of disposal and reporting
- Goes beyond RCRA to require recycling & diversion

HCWL - RCRA Comparison

- ⦿ Elements of Claim = RCRA
- ⦿ Nature of Liability = RCRA but NOT retroactive prior to 1972
- ⦿ Persons Liable = RCRA
- ⦿ Defenses = RCRA
- ⦿ No Private Attorney General

HCWL - RCRA Comparison

- ⦿ No Right to Jury Trial = RCRA
- ⦿ Injunctive Relief, Contribution & Indemnity Rights - NOT like RCRA
- ⦿ Jurisdiction: Either State or Federal Courts

PROPOSITION 65

- Proposition 65 was enacted as a ballot initiative in 1986.
- The Act is intended to warn citizens of exposure to substances that are known to cause cancer, birth defects, and other reproductive harms.

WARNING!

Nearly all fish and seafood contain some amount of mercury and related compounds, chemicals known to the State of California to cause cancer, and birth defects or other reproductive harm. Certain fish contain higher levels than others.

Pregnant and nursing women, women who may become pregnant, and young children **should not eat** the following fish:

SWORDFISH · SHARK · KING MACKEREL · TILEFISH

They should also limit their consumption of other fish, including **fresh or frozen tuna**.

Fish and seafood can be an important source of nutrients and an important part of a balanced diet. However, the Federal Food and Drug Administration advises pregnant and nursing women and women who may become pregnant to limit their consumption of fish to no more than 12 ounces per week.

Fish that tend to have little or no mercury include salmon (fresh, frozen, or canned), shrimp, and scallops. Mercury levels in canned tuna vary, but on average are lower than levels in many other fish. Chunk or chunk light tuna has less mercury than solid white or chunk white tuna.

The California Department of Health Services ("DHSS") recommends certain steps you can take to reduce mercury exposure:

- Eat a variety of different types of fish.
- Eat smaller fish rather than larger, larger fish.
- Begin following these guidelines one year before becoming pregnant.

For more information consult the following websites:
U.S. Food and Drug Administration ("FDA") www.fda.gov
U.S. Environmental Protection Agency www.epa.gov/mercury
California Department of Health Services www.dhs.ca.gov/pd/foods/fish/0802/limits/mercury_in_fish.html
or call the FDA toll-free at 1-888-SAFEFOOD (1-888-724-3164).

KEY PROVISIONS

- ⦿ Requires the Governor to publish, at least annually, a list of chemicals known to the state to cause cancer or reproductive toxicity.
- ⦿ Public Notice of Exposure.
- ⦿ Ban on releases where might reach drinking water source.
- ⦿ Sr. government workers must report actual or threatened releases to Bd of supervisors with 72 hours.
- ⦿ Citizen suit “bounty hunter provisions”.

Prop 65 Exemptions

- ⦿ Federal warning labeling laws preempts
- ⦿ Business < 10 employees
- ⦿ Government owned facilities
- ⦿ Show that exposure poses (1) no significant risk for life time (carcinogen)
(2) no observable effect of acute exposure at 1000X exposure level (reproductive toxins).

WHAT YOU CAN DO

- ⦿ Report Spills, Releases and Illegal Activity.
- ⦿ Education.
- ⦿ Citizen Suits.



Report Illegal Activity

If you witness something, report activity or spill:

- First call 911
- Governors Office of Emergency Services,
California State Warning Center
1-800-852-7550.
- Fire Department.

Educate Yourself

- ① Educate yourself re: industrial activities that may be of concern:
 - PRAR/FOIA
 - Self reporting by regulated businesses
 - Should you be concerned? Prop 65 chemicals, amount of exposure etc.

CITIZEN SUITS

- ⦿ A citizen suit is simply a lawsuit by a private citizen to enforce a statute.
- ⦿ Citizen suits come in two forms.



CITIZEN SUITS

- Under several of the environmental laws of the United States, Congress has provided for citizen suits against:
 - (1) polluters/violators; and
 - (2) against the EPA Administrator to force the Administrator to perform certain nondiscretionary duties under the law. Such citizen suit provisions appear in the following federal statutes:

CITIZEN SUIT PROVISIONS IN ENVIRONMENTAL LAWS

- **Clean Air Act** Section 304, 42 U.S.C. § 7604 (1990).
- **Federal Water Pollution Control Act** (Clean Water Act) Section 505, 33 U.S.C. § 1365 (1987).
- **Resource Conservation and Recovery Act (RCRA)** Section 7002, 42 U.S.C. § 6972 (1984).

CITIZEN SUIT PROVISIONS IN ENVIRONMENTAL LAWS

- **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 310, 42 U.S.C. § 9659 (1986).**
- **Emergency Planning and Community Right-to-Know Act of 1986 Section 326, 42 U.S.C. § 11046 (1986).**
- **Toxic Substances Control Act Section 20, 15 U.S.C. § 2619 (1982).**

CITIZEN SUIT PROVISIONS IN ENVIRONMENTAL LAWS

- **Safe Drinking Water Act Section 1449, 42 U.S.C. § 300j-8 (1982).**
- **Surface Mining Control and Reclamation Act of 1977 Section 520, 30 U.S.C. § 1270 (Supp. III 1985).**
- **Marine Protection, Research, and Sanctuaries Act of 1972 (Ocean Dumping Act), Section 105(g), 33 U.S.C. § 1415(g) (1982).**

CITIZEN SUIT PROVISIONS IN ENVIRONMENTAL LAWS

- **Noise Control Act of 1972** Section 12, 42 U.S.C. § 4911 (1982).
- **Endangered Species Act of 1973** Section 11(g), 16 U.S.C. § 1540(g) (1982).
- **Deepwater Ports Act of 1974** Section 16, 33 U.S.C. § 1515 (1982).
- **Outer Continental Shelf Lands Act** Section 23, 43 U.S.C. § 1349(a) (1982).

MORE INFORMATION

- ◎ www.epa.gov/eviro - EPA historical data and environmental information.
- ◎ www.scorecard.org – Developed by the Environmental Defense Fund, provides historical data on Community Right-to-know Toxic Release Inventory Facility Reports.
- ◎ www.osha.gov/oshstats - Provides OSHA inspection data for each inspected facility.

MORE INFORMATION

- ◎ www.osha.gov/comp-links.html - OSHA regulations and compliance links.
- ◎ www.geotracker.swrcb.ca.gov
- ◎ www.oehha.ca.gov/prop65/prop65_list/Newlist.html (prop 65 list of chemicals).
- ◎ www.swrcb.ca.gov/water_laws/docs/portercologne.pdf (Porter-Cologne Water Quality Control Act).

MORE INFORMATION

- ◎ www.ciwmb.ca.gov/PermitToolbox/CEQA/Toolbox.htm (CEQA)
- ◎ www.epa.gov/safewater/sdwa/index.htm (Safe Drinking Water Act)
- ◎ www.airquality.org/stateplan/index.shtml#CCAA (California Clean Air Act)
- ◎ www.arb.ca.gov/legis/legis.htm (Air Resources Board -- report air pollution)

BIBLIOGRAPHY

- Thomas J. Bois, Legal and Regulatory Framework for Environmental Management (Winter 2006) Slides 19-37, 41-48.
- Wallid Kazi, Environmental Sampling and Analysis (Summer 2005) Slides 7, 9-13.