



Why Are We Here? The Purpose of Environmental Analysis

....The history behind the job

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Chief Regulatory Officer
ESC Lab Sciences*



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“Love”

For

Money

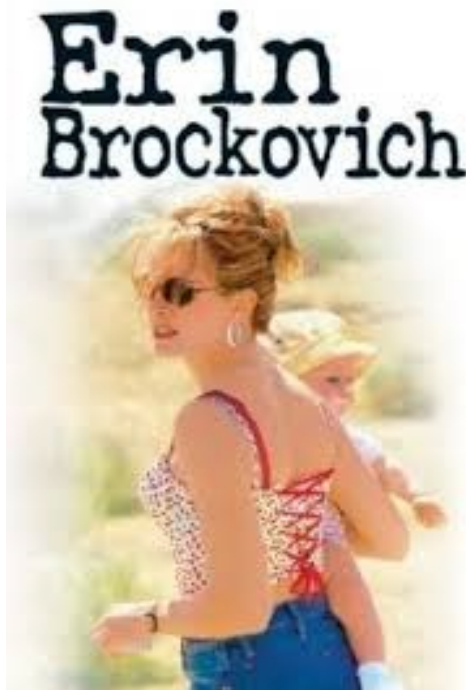


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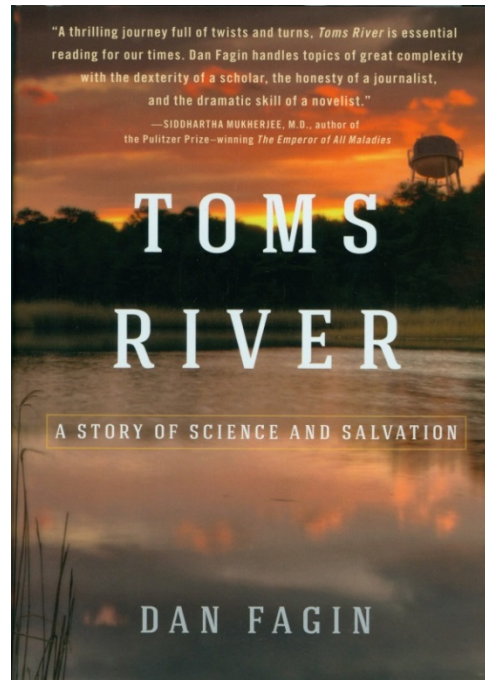
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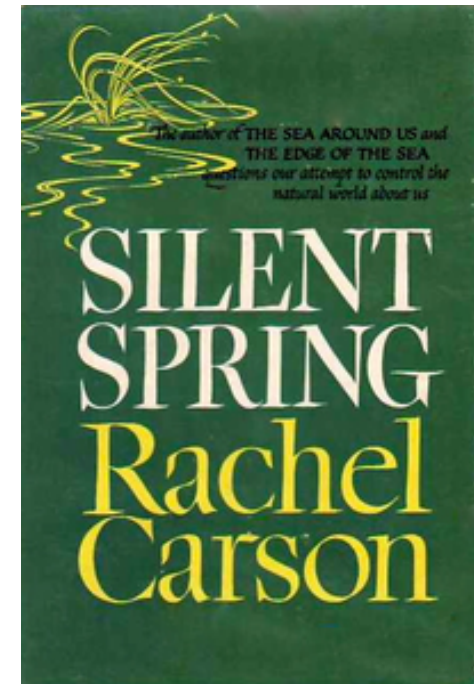
Environmental Disasters



Cr+6 Discharged into
ponds 1952-1966 by
Pacific Gas and Electric



Organic waste piped to
the Atlantic and waste
dumped into pits by **Ciba
Geigy** and **Union Carbide**
from 1952 - 1990



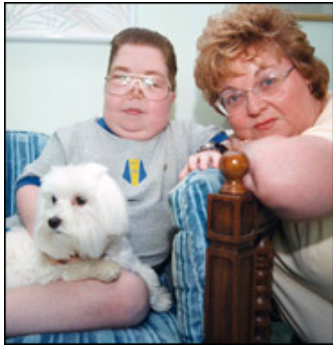
1962 - The book revealed the
tragic effects of pesticides and
fuel oil on the environment
and animals.



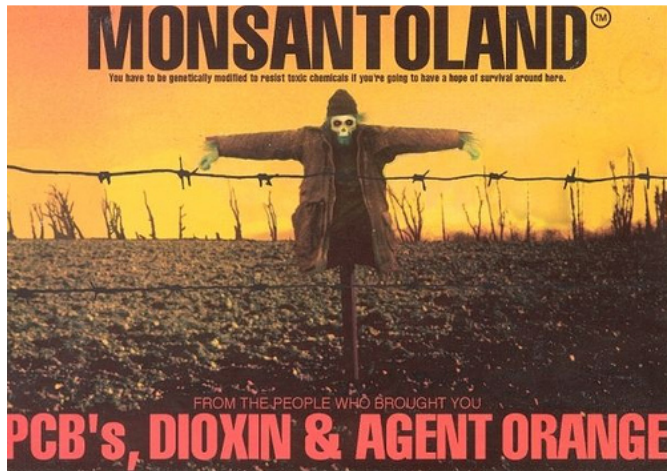
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**Toms River
NJ
Ciba Geigy
1950s**



Monsanto produced PCBs from **1929 to 1971** in Anniston, AL. Resulted in toxic water, high cancer rate, & mutated fish.

Historical...but not so long ago



**"Valley of the Drums"
Louisville, KY 1960s**



**1969
Cleveland
OH**



**Cuyahoga
River Fire**



**1989 Exxon
Valdez**



1742 - 1970

**Picher OK
"Chat"
Piles
25K acres
of lead
mine
waste**



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What about now? Environmental Disasters Continue...



April 2010
BP Gulf Oil Spill



December 2008
TVA Coal Ash Spill
Kingston, TN



Is revenue more
important than
safety?

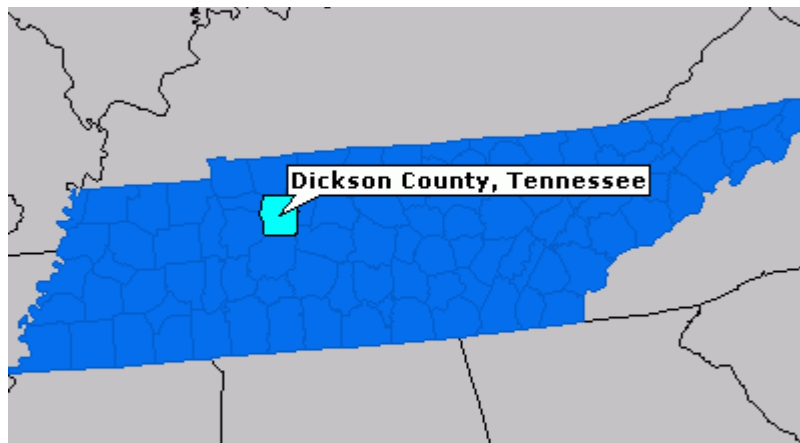


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Notably close to my home....



Dickson County Landfill

Trichloroethylene (TCE) Contamination that leached into drinking water wells in a small community located beside the landfill.

The first detection was in **1988** and in 2000, **TCE** was detected at **145ppb**.

Facts:

- **Illegal dumping** occurred at the site that contained **solvents and other chemicals**
- Contaminants migrated into **drinking water supplies**; both public and **private (wells)**
- High levels of **birth defects** occurred in children
- **Millions in lawsuits** have been settled



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What does all of this mean?

We have spent more time abusing our natural resources.....

than we have cleaning up our mess!



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History before the Environmental Protection Agency (EPA)

Clean Air Act

- **1955** – First Air Pollution Control Act
- **1963** – Clean Air Act first federal legislation addressing air pollution *control*
- **1967** - The Air Quality Act was enacted in order to expand federal government activities

Federal Drinking Water Standards

1914 - U.S. Public Health Service set standards for bacteria in DW
1925, 1946 – Additional standards
1962 - Regulating 28 substances

Clean Water Act

1948 - Federal Water Pollution Control Act

Solid Waste

1965 - Solid Waste Disposal Act

*** Multiple other Acts were passed that addressed specific issues**



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History Before Occupational Safety and Health Administration (OSHA)

First Standards – Mainly Physical Safety

1877 - Massachusetts passed the nation's first safety and health legislation

1890 - nine states provided for factory inspectors. 21 other states offered limited provisions for health hazards

1st Recognition of Particulate Exposure

1903 - U.S. Bureau of Labor began publishing graphically detailed studies of occupational fatalities and illnesses in the dusty trades

A Shift Toward Broader Requirements

1913 - Department of Labor was formed

1930s – All states had laws requiring job-related safety measures.

Workplaces will be “as safe as science and law can make them”

1934 - Bureau of Labor Standards. 1st permanent federal agency established primarily to promote safety and health for working men and women.



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By the end of the 60s..... the combined regulations would not be enough

- Independent studies were taking place
- News and specialty groups were publishing horror stories regarding industrial waste
- Environmental activists were visible in many of the issues
- Epidemiology had not fully entered into the job safety considerations
- Certain chemicals had not been officially tied to particular health conditions.
- Private citizens were spending time trying to figure out why certain illnesses were occurring



December 2, 1970 – Beginning of the EPA



President Nixon:

1969 – National Environmental Policy Act redirected the government's role to protect the earth, air, land, and water.

Dec. 2, 1970 - signed the approval to establish both the **Environmental Protection Agency (EPA)** and the **National Oceanic & Atmospheric Administration (NOAA)**



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April 28, 1971 - Beginning of OSHA



President Nixon:

December 29, 1970 - Signed OSHA into law at a time where approximately **14,000** occupational **fatalities** were being reported each **year** as well as **2.5 million job-related disabilities** and **300,000 new cases** of job-related **illnesses**.

August 27, 1971 - effective date for the standards . The standard covered many industries not regulated. They gave a **90-day grace period** to enable all newly covered employers to familiarize themselves with the standards and to become compliant with the new requirements.



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So...do we have pollution under control?

No! But, we have controls in place.

Year	Law & Regulation
1970	Clean Air Act (CAA) 42 USC – 40 CFR 50 - 97 Emissions and Air Toxics Monitoring and Control of stationary and mobile sources
1972	Clean Water Act (CWA) 33 USC– 40 CFR Part 136 & 503 (sludge) Monitoring Discharges to Surface Waters & POTWs
1974	Safe Drinking Water Act (SDWA) 42 USC– 40 CFR Part 141 Post Treatment Monitoring of Public Supplies



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So...do we have pollution under control?

No! But, we have controls in place.

Year	Law & Regulation
1974	Toxic Substances Control Act (TSCA 1976) 15 USC – 40 CFR 700-766 regulates the distribution and use of chemicals and specifically regulates use of polychlorinated biphenyl (PCB) products, asbestos, radon and lead-based paint.
1976	Resource Conservation & Recovery Act (RCRA 1976) 42 USC – 40 CFR 260-273 Monitoring Wastes/Waste Sites to Protect Natural Resources From Improper Waste Disposal Underground Storage Tanks 42 USC – 40 CFR 279-282



So...do we have pollution under control?

No! But, we have controls in place.

Year	Law & Regulation
1980	<p>Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 42 USC– 40 CFR 300</p> <p>This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances</p> <p>Remedial Monitoring of Uncontrolled/Abandoned Haz. Waste Sites</p>
1986	<p>Emergency Planning & Community Right-to-Know Act (EPCRA)</p> <p>42 U.S.C.</p>



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Agency Control & Oversight



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Daily Laboratory Life – The Responsibility

Everything we (labs) do assesses the safety of something we encounter on a daily basis.

- Food & Beverage
- Water
- Agriculture
- Air
- Healthcare products
- Products (CPSC)
- Etc.

Our responsibility as laboratories and as environmental analysts is key to the safety and well-being of today and of the future.



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Clean Air Act - 1970

42 USC – 40 CFR 50 - 97

- Authorized the establishment of **National Ambient Air Quality Standards**
- Established requirements for **State Implementation Plans** to achieve the National Ambient Air Quality Standards
- Authorized the establishment of **New Source Performance Standards** for new and modified stationary sources
- Authorized the establishment of **National Emission Standards for Hazardous Air Pollutants**
- Increased **enforcement** authority
- Authorized requirements for **control of motor vehicle emissions**



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Regulated Air Pollutants

Primary Air Pollutants:

- ***carbon monoxide (CO)***
 - odorless, colorless, poisonous gas
- ***oxides of nitrogen (NO_x , NO)***
 - NO - nitric oxide
 - emitted directly by autos, industry ✓
- ***sulfur oxides (SO_x)***
 - SO_2 - sulfur dioxide
 - coal burning – main contributor
 - causes acid rain problem
- ***particulate matter (dust, ash, salt particles)***
- ***volatile organic compounds (VOCs)***
 - highly reactive organic compounds

EPA Hazardous Air Pollutants (HAPs)

- Federal Level Monitoring: 187 Compounds From Industrial Sources.
- National Emission Standards for Hazardous Air Pollutants

State Level Programs: Indoor Air, Soil Gas (examples)

- NJ Vapor Intrusion, Soil gas & Residential Indoor Air
- EPA Regions III, VI & IX Residential Air
- CA Region IX, Ambient Air
- IL TACO SRO, Residential Inhalation
- KS Tier II, Risk Based Standard – Residential Indoor Air



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Air Testing - Examples



Class	Analytes	Method
Landfill Gases Hydraulic Fracturing	Ethane, Ethene, Methane, Propane, Acetylene	8015 Mod
Landfill Gases TO-15 Leak Detection	Methane, Carbon Dioxide, Carbon Monoxide, Oxygen	ASTM D1946
Petroleum Stack Testing	BTEX-M/GRO	Method 18 Mod
Vapor Intrusion Indoor Air Quality General VOC Scan	Volatiles	TO-15, TO-17
Low Level Chlorinated Site Monitoring	Volatiles	TO-15 SIM



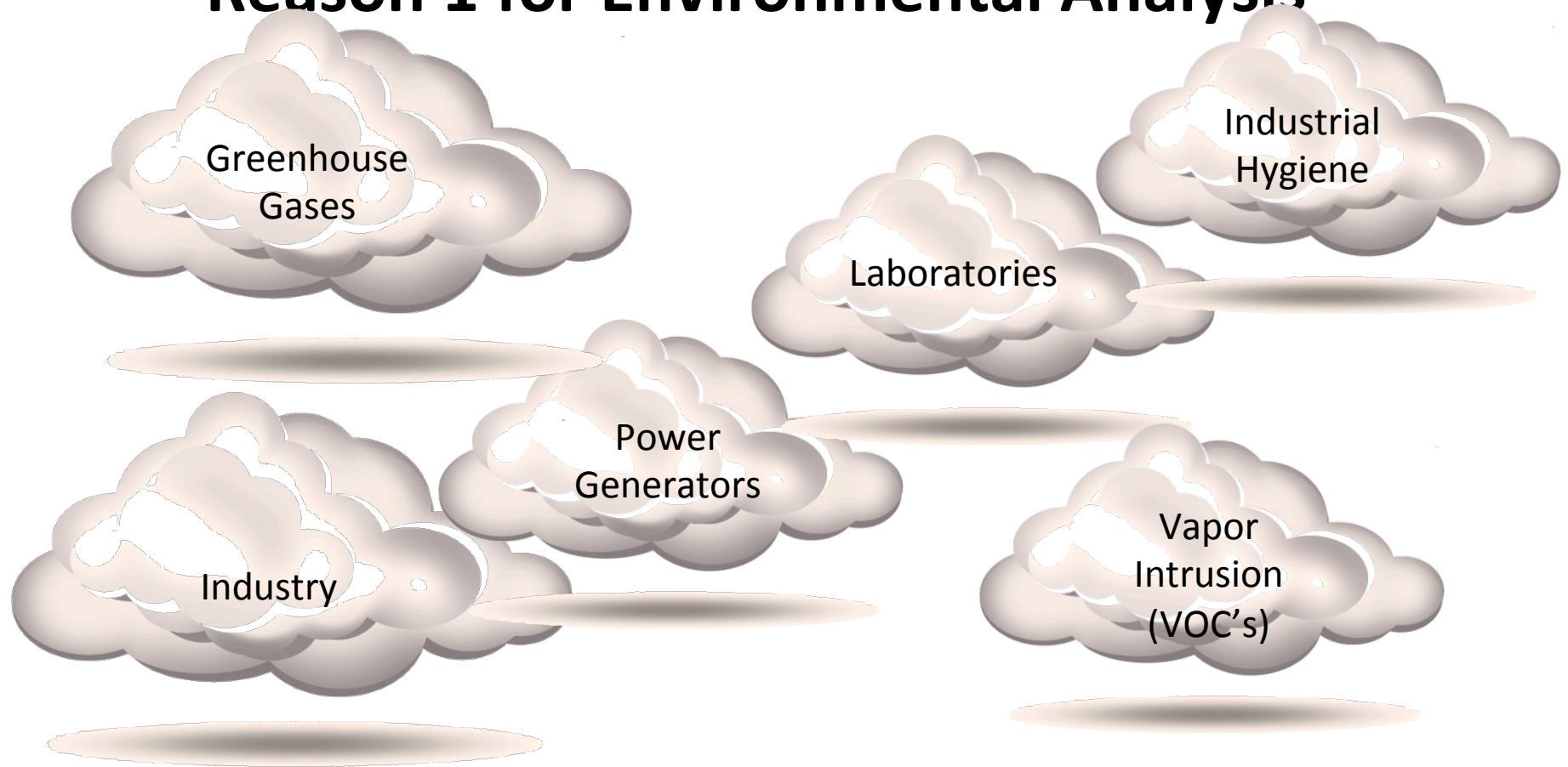
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Reason 1 for Environmental Analysis



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Safe Drinking Water Act (SDWA)

- Passed by Congress in 1974, amended in 1986 & 1996
- Found in 42 USC
- Authorizes EPA to set national health standards for DW called the National Primary Drinking Water Regulations (NPDWR)
- SDWA applies to every public water system in the United States
- More than 160,000+ (in 2004) public water systems that provide water to almost all Americans at some time
- Most states, Territories and 4 Indian Tribes have **“Primacy*”** (55 out of 57, except WY and DC). The State/Territory has authority from EPA to enforce NPDWRs.

* **“Primacy”** is the designation of a body to oversee compliance with regulations, it can be a State or Tribe or the Regional EPA office.



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SDWA – Regulated Pollutants

40 CFR Part 141

- * **National Primary Standard**

- Microorganisms: Crypto, Giardia, HPC, Legionella, Coliforms
- Disinfectants/ Disinfection Byproducts: HAA, TTHM, Cl₂ Analogs
- Inorganics: Mets ; Organics: VOA, Pest; Radionuclides: α , β , Ra, U

- * **Secondary Standards**

- Non-Enforceable, cosmetic/aesthetic; Mets, Solid, Odor, Color

- * **Unregulated Contaminants**

- UCMR, Rounds 1 – 3
 - Currently Round 3: Hormones, VOA, SOCs, Metals, Perfluoro, Viruses

- * **State Specific: Can be More Stringent Than Federal**

- Example: NJ Requires Full Method List for Volatile Organics



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Methods: SDWA

Methodology (most commonly used):

- | | |
|----------------------|--|
| ✓ Organics analytes) | EPA 500 Series Standard Methods 6000 Series (Limited |
| ✓ Metals | EPA 200 Series Standard Methods 3000 Series |
| ✓ Wet Chemistry | EPA 100, 300, 400 Series Standard Methods 2000 & 4000 Series |
| ✓ Bacteria | Standard Methods 9000 Series |
| ✓ Crypto/Giardia | EPA 1622, 1623 |
| ✓ Others | ie: Radchem, Asbestos, Dioxin – Various methods |

*** NOTE: All methods must be the most recently promulgated revisions**

Potable Water: Drinking Water Systems, Delivery Point Monitoring, Receptor Wells, Private Wells, etc.

Matrices: Drinking Water, Low Concentration Water Analysis.



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SDWA – Methods Required

40 CFR Part 141.21 -.29

Subpart C – Monitoring & Analytical Requirements

<u>§141.21</u>	Coliform sampling.
<u>§141.22</u>	Turbidity sampling and analytical requirements.
<u>§141.23</u>	Inorganic chemical sampling and analytical requirements.
<u>§141.24</u>	Organic chemicals, sampling and analytical requirements.
<u>§141.25</u>	Analytical methods for radioactivity.
<u>§141.26</u>	Monitoring frequency and compliance requirements for radionuclides in community water systems.
<u>§141.27</u>	Alternate analytical techniques.
<u>§141.28</u>	Certified laboratories.
<u>§141.29</u>	Monitoring of consecutive public water systems.
<u>Appendix</u>	<u>Appendix A to Subpart C of Part 141—Alternative Testing Methods Approved for Analyses Under the Safe Drinking Water Act</u>



Drinking Water Reason 2 for Environmental Analysis

Disinfection
Byproducts
THM's
HAA's

Ground Water

Benzo (a)
Pyrene and
other PAH's

Rad Chem
Asbestos
Dioxin

Personal
Care
Products
(PCPs)

Cyanide
Cr ⁺⁶

Wells,
Surface
Water

Cryptosporidium
Giardia
Viruses

VOC's
Benzene
TCE, etc.



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Clean Water Act 1972 (Wastewater)

33 USC– 40 CFR Part 136 & 503 (sludge)

Establishes environmental programs, such as:

- National Pollutant Discharge Elimination System (NPDES) program
 - to protect the Nation's surface waters (lakes, rivers, streams etc.)

The CWA language charges EPA to develop, implement, and enforce regulations consistent with this law including:

- ★ Setting effluent limits, guidelines, and standards for: “waters of the US” - relatively permanent, standing or continuously flowing bodies of water such as streams, oceans, rivers, and lakes.”
- ★ Categorize and permit those entities discharging into these waters.
- ★ Oversight over all States/Tribes NPDES permitting and issue permits in the non-primacy States.
- ★ Collecting and distributing data on water quality
- ★ Standards for the use/disposal of sewage sludge
- ★ Stormwater runoff & management

★ ...but does not directly address groundwater (See SDWA & RCRA)



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Clean Water Act – Regulated Pollutants

- **Priority Pollutants – 126 compounds/analytes**
 - ✓ Organics: VOA – 31; SVOA - 60, Pest - 18, PCB - 8
 - ✓ Metals: 13
 - ✓ Wet Chemistry: Cyanide
- **Conventional pollutants**
 - ✓ BOD, TSS, Oil and Grease, Fecal Coliform bacteria, and pH
- **Non-Conventional pollutants**
 - ✓ Everything else....
 - ✓ e.g., Chlorine, ammonia, nitrogen, phosphorus
- **Permit Driven Specifications**
 - ✓ Discharge Specific Compounds of Concern



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Clean Water Act Methods

Methodology (most commonly used):

- ✓ Organics EPA 600 & 1600 Series 6000 Series (Standard Methods)
- ✓ Metals EPA 200 Series 3000 Series (Standard Methods)
- ✓ Wet Chemistry EPA 100, 300, 400 Series | 2000, 3000, 4000, & 5000 Series (Standard Methods)
- ✓ Bacteria 9000 Series (Standard Methods)

Non-Potable Water:

Discharge Permit Monitoring, Surface Water Discharges, Processed Wastewater to any receiving water including groundwater, discharges to POTWs, streams/lakes etc.

Matrices:

Wastewaters & Surface Waters Only



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Waste Water Reason 3 for Environmental Analysis

Sludge
Land
Application

Priority
Pollutants

Metals

VOC's

Inorganics

Aquatic
Toxicity

Sewage
(Bacteria)

Waste
Water
Treatment
Plants

NPDES

Industrial
Effluent,
Stormwater,
Raw Sewage



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Resource Conservation and Recovery Act (RCRA) 1976

42 USC – 40 CFR 260-273

- **Part 258 Criteria for Municipal Solid Waste Landfills - Leachate Monitoring of RCRA Facilities**
 - ✓ **Appendix I: Detection Monitoring of RCRA Facilities**
 - ✓ **Appendix II: List of Hazardous Inorganic and Organic Constituents**
- **Part 268 Land Disposal Restrictions**
 - ✓ **Appendix III: List of Halogenated Organic Compounds Regulated**
 - Subpart C: Prohibitions
- **Part 261 Identification And Listing Of Hazardous Waste**
 - ✓ **Appendix VIII: Hazardous Constituents of Wastes**
- **PART 264 Standards For Owners And Operators Of Hazardous Waste Treatment, Storage, And Disposal Facilities**
 - ✓ **Appendix IX: GW Monitoring of Permitted Facilities**
- **State/Region Regulatory Lists**
 - ✓ NJ Groundwater Criteria
 - ✓ CT Residential Volitization Criteria
 - ✓ FL Leachability Based on Groundwater Criteria
 - ✓ NC SWSLs
 - ✓ Region IX PRGs



Resource Conservation and Recovery Act (RCRA) Methods

40 CFR Parts 239 – 299

- ✓ 239 – 259: Solid Waste
- ✓ 260 -279: Hazardous Waste

Methodology – SW-846; Test Methods for Evaluating Solid Wastes

Organics:	3500, 3600, 5000, 8000 Series
Metals:	3000, 6000, 7000 Series
Wet Chemistry:	1000, 9000 Series
Immunoassay:	4000 Series

A few
examples

Applications Solids, waters and organic wastes associated with disposal or monitoring of disposal sites, and includes waste categorization

Matrices Any matrix



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RCRA - Methods

SW-846; Test Methods for Evaluating Solid Wastes

Methods are NOT promulgated (different from other EPA programs):

All published SW-846 methods are available for use via the June 2005, “Methods Innovation Rule” (**MIR**).

Regulatory Guidance: Method flexibility

Regulatory Lists: RCRA Subprograms

Compound lists customized or sub-program specific

State standards: cleanup criteria

Sample Preparation: Method driven but many choices

Calibration: Detailed specifications

Quality Control: Well defined

Data Reporting: No defined format

State specific regulatory deliverables may apply

Data Used For Subprogram Requirements, State Limits



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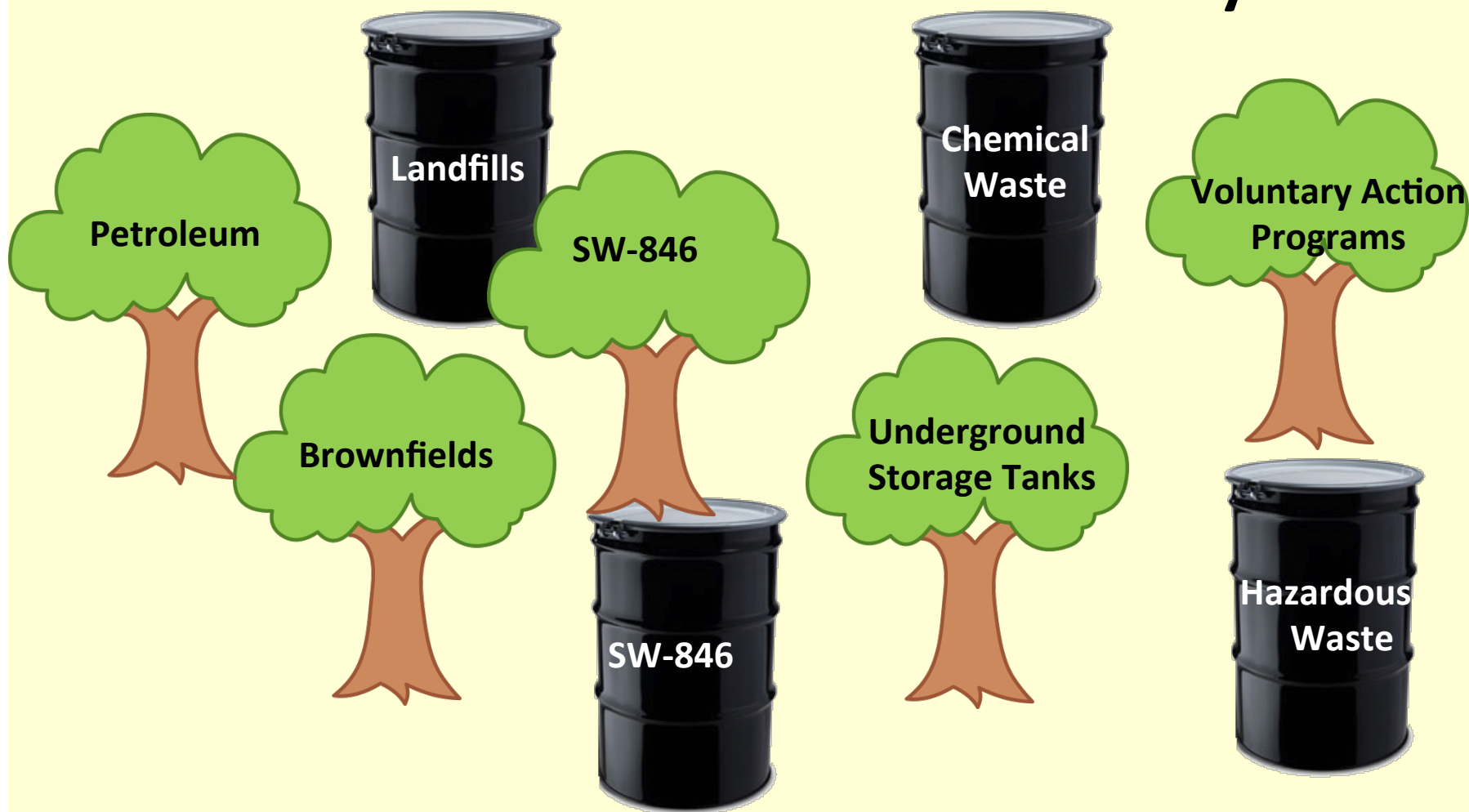


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RCRA

Reason 4 for Environmental Analysis



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Toxic Substances Control Act (TSCA) 1976

15 USC – 40 CFR 700-766

- Regulates the distribution and use of chemicals and specifically regulates use of polychlorinated biphenyl (PCB) products, asbestos, radon and lead-based paint.
- EPA was given the authority to require testing, as well as to regulate the production, use, and disposal of new and existing chemicals.
- Requires that manufacturers or importers of new chemicals notify the Agency 90 days before manufacturing a new chemical substance.



Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 1980 42 USC– 40 CFR 300

- **September 11, 1980** – A plea was made to Congress by the EPA Administrator to pass the legislation establishing “Superfund”.
- This law provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances
- Required remedial monitoring of uncontrolled/abandoned haz. waste sites

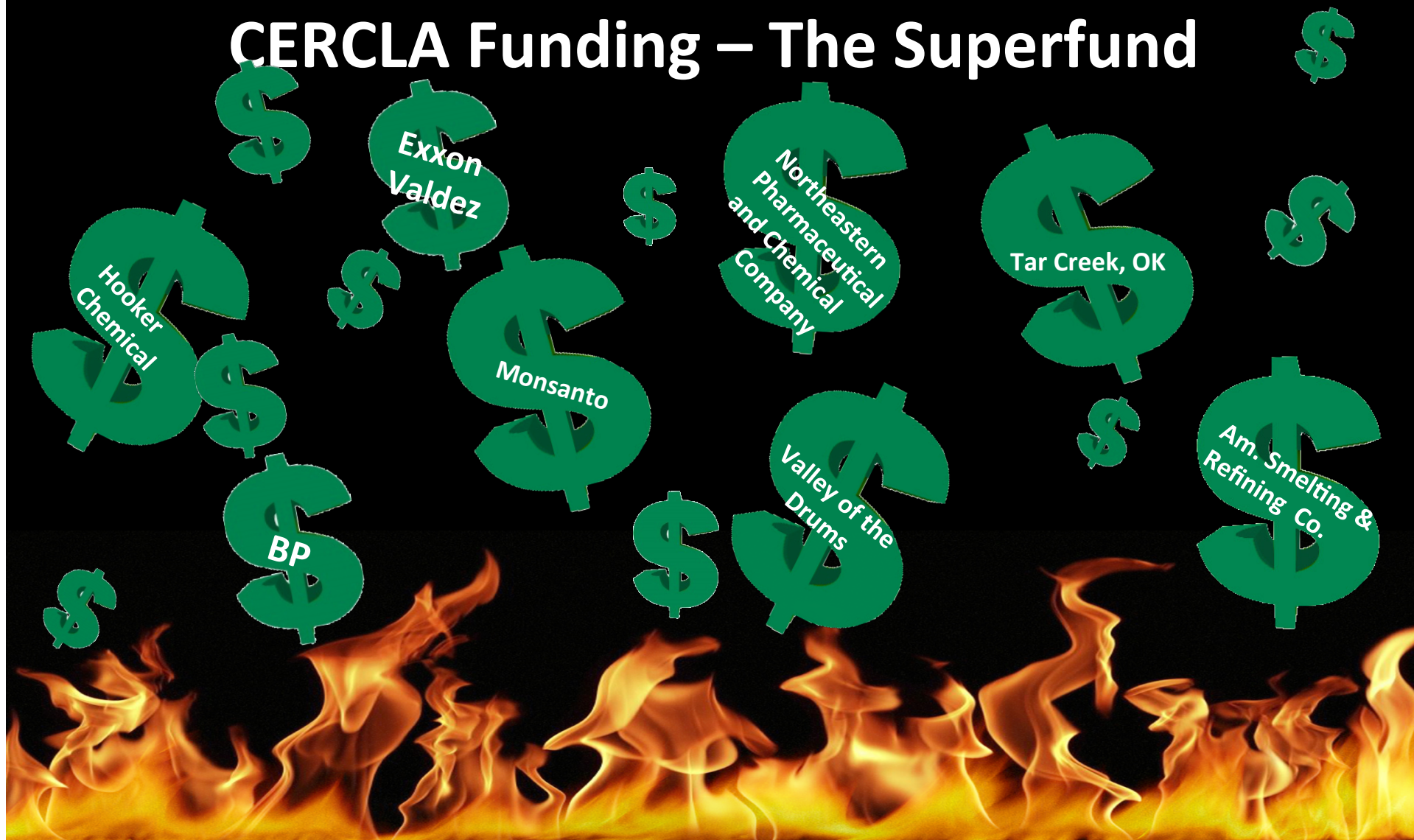


CERCLA – Nickname “Superfund”

- The fund would require fees to certain types of chemical producers and the petroleum industry
- The fund would also collect money (fines) from responsible parties
- The fund would be used to clean up past and future issues
- In 1980, EPA Noted the following from a survey of 250 sites:
 - ☠ 32 sites where 452 drinking water wells had to be closed because of chemical contamination
 - ☠ 130 sites where water supplies and groundwaters had been contaminated but wells have not been closed
 - ☠ 27 sites with actual damages to human health (kidneys, cancer, mutations, aborted pregnancies, etc.)
 - ☠ 41 sites where soil contamination made the land unfit for livestock or human uses
 - ☠ at least 36 sites where income loss could be expected as a result of loss of livestock, fish kills, crop damage and similar losses



CERCLA Funding – The Superfund



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Emergency Planning & Community Right-to-Know Act (EPCRA) 42 U.S.C. (1986)

- The response to concerns regarding the environmental and safety hazards posed by the **storage and handling of toxic chemicals**.
- Triggered by the **1984 disaster in Bhopal, India**, caused by Union Carbide's accidental **release of methylisocyanate**. The release killed or severely injured more than 2000 people.
- Requires all **businesses to report** the storage and use of all chemicals above the Reportable Quantities (RQs) established under CERCLA.
- Requires **local emergency management** (such as LEPCs) to communicate with area businesses to aid in the reporting process.



Reason 6

Last but not Least.....Additional reasons we here?

1322
Good
Reasons



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***Thanks so much for your time and
attention..... And for humoring a little bit of
environmental history!***

Any Questions?



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