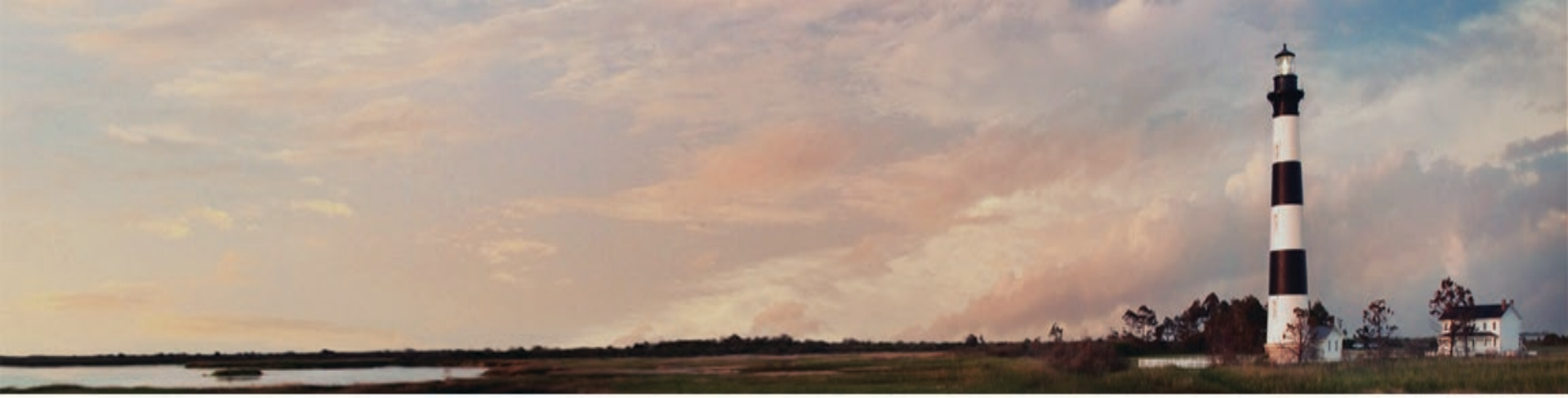

Waste Minimization

Department of Environmental Quality

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Waste Minimization

- No “Cookie Cutting” - **Site Specific Needs**
- Avenues & Strategies for **Success**
- Goal: **Succeeding in the Most Responsible Way Possible**

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WHY?

Rules & Regulations

The **US EPA** has emphasized waste minimization and pollution prevention as the preferred method of environmental protection over "end-of-pipe" treatment and disposal approaches.

Intertwined with Cradle to Grave Concept

(Includes extraction of material, management of material, disposal of material)

Waste Minimization is a waste management approach that focuses on reducing and/or eliminating the amount & toxicity of hazardous waste generated.

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RCRA & HSWA

Rules & Regulations

1976

Resource Conservation & Recovery Act (RCRA)

1984

Hazardous & Solid Waste Amendments (HSWA)

This is when Hazardous Waste (HW) Minimization became a **priority**; National Policy **declared**: Wherever ***feasible***, the generation of HW is to be ***reduced* or *eliminated*** as ***efficiently*** as possible.

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Waste Minimization Certification

Rules & Regulations

40 CFR 262.27 A Large Quantity Generator (LQG) or Small Quantity Generator (SQG) who initiates a shipment of HW will certify as such in Item 15 Uniform Hazardous Waste Manifest:

(a) "I am a Large Quantity Generator. I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment."

(b) "I am a Small Quantity Generator. I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford."

Waste Minimization Plan

- Maintain a written Waste Minimization Plan
- If no written plan is maintained, be prepared to fully **explain** & **demonstrate** your Waste Minimization activities during the inspection process. Have at a minimum a written Policy Statement.

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Waste Minimization & Biennial Report

The Biennial Report Reflects:

- The **Efforts** undertaken during the year to **Reduce** the **Volume & Toxicity** of the HW generated;
- The **Changes** in **Volume & Toxicity** achieved in comparison to previous years.

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Waste Minimization Does Not Include:

- Waste Treatment:

  Processes designed to change the physical, chemical, or biological composition of waste streams (compacting, neutralizing, diluting, incineration)

- Energy Recovery
- Disposal of Waste
- Dilution for Toxicity Reduction (Illegal per RCRA!)

Waste Minimization = Source Reduction & Recycling

Waste Minimization includes any ***Source Reduction*** or ***Recycling*** activity undertaken by a generator that results in:

1. The reduction of total volume or quantity of HW;
2. The reduction of toxicity of HW; or
3. Both, as long as the reduction is consistent with the goal of minimizing present and future threats to human health and the environment.

Benefits of Waste Minimization

Improvements

IMPROVES

Profits

Product Quality

Production Efficiency

Good Neighbor Image

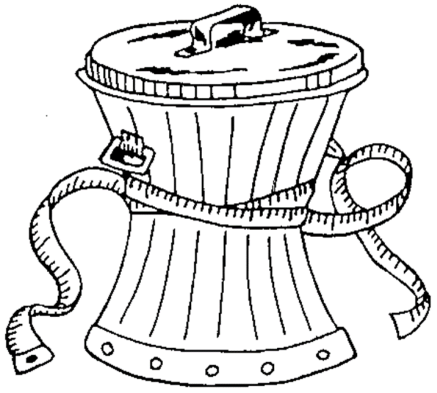
Environmental Performance

Benefits of Waste Minimization

Reductions

Reduce

- The quantity and toxicity of hazardous and solid waste generation
- Raw material and product losses
- Raw material purchase costs
- Waste management recordkeeping and paperwork burden
- Waste management costs
- Workplace accidents and worker exposure
- Compliance violations
- Environmental liability



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Source Reduction

Source Reduction reduces or eliminates the generation of waste at the source and refers to any practice that reduces the use of hazardous materials in production processes. This Includes:

- **Early retirement of equipment** such as mercury-containing devices like switches, manometers and thermostats;
- **Reformulating or redesigning products**, such as creating new PVC compounds without using lead;
- **Using less toxic feedstocks**, such as switching to the use of lead-free solder in manufacturing;
- **Improving work practices**, such as reorganizing paint batches in order to reduce cleaning operations.

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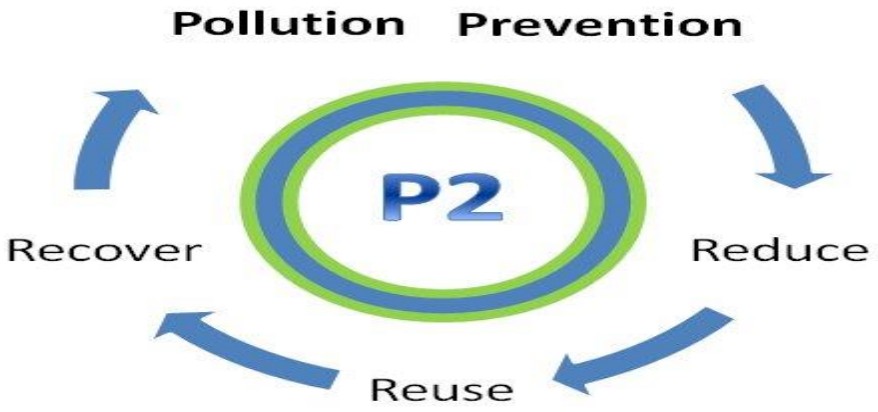
Source Reduction = Pollution Prevention

Source Reduction is also known as **Pollution Prevention (P2)**

- Reduction of total volume & toxicity of HW at the source
- 1990 Pollution Prevention Act: Refers to the source reduction of **all** toxic wastes – including into the air, water & land resources – **prior to** recycling, treatment or disposal activities.
- Pollution Prevention should become part of your business culture. Everyone from top management to staff should implement practices that improve the overall operation of your facility, protect the environment and build a good neighbor image.



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Source Reduction Strategies

Reducing Your Waste Generation

- Personnel Training
- Good Housekeeping
- Reuse/Recycling
- Inventory Control
- Preventative Maintenance
- Process Changes
- Waste Audits
- Use of Less Hazardous (or Non-Hazardous) Products
- Minimize Resource Usage

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Source Reduction Strategies

Personnel Training

- Better trained personnel make fewer mistakes and a better product; especially when provided the proper tool for the job at hand (Process Upgrades).
- All personnel with hazardous waste responsibilities should receive thorough introductory and refresher training to ensure that proper procedures are followed for HW requirements.

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Source Reduction Strategies

Good Housekeeping

Good Housekeeping is a safeguard against unexpected and costly environmental problems at your business. General Housekeeping protects against product loss.

Good Housekeeping Includes:

- Procurement
- Proper Storage/Container Strategies
- Handling
- Spill Preparedness
- Disposal and Training

Source Reduction Strategies

Procurement

Procurement strategies begin with evaluating your purchasing practices:

- Establish a procurement schedule.
- Chart your material use and needs.
- Check your vendors' policies on "buy-back" or returns, material guarantees, or and any other amenities they may provide.

Remember, the hazardous waste market is competitive enough wherein contactors are looking for ways to add value to their service and set themselves apart from the competition.

Source Reduction Strategies

Proper Storage Containers

Proper container management can guard against loss of product. It can assist with proper segregation of hazardous/non-hazardous materials.

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Source Reduction Strategies

Reuse/Recycling

- Recycling is an age old concept: Reclaiming value from production by-products;

- Recycling can often be utilized when Source Reduction is not economically practical;

- Reuse or recovery of in-process materials or materials generated as by-products that can be processed further on-site or sent offsite to reclaim value;

- Material can be used again, though not necessarily for its original purpose ("Thinking Outside the Box").

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Source Reduction Strategies

Recycling Examples

Alternate Uses Include:

- **Incorporating** hazardous waste into other products: using waste material to make other materials such as asphalt.
- **Reclamation** of waste to recover usable components: distilling used solvents to re-purify them; reclaiming metals, paint & batteries.
- **Direct use or reuse** of a waste as an ingredient in a product or substitute product: latex paint can be mixed with ash to make cement mix for concrete.
- **Recovery and/or purification** of spent solvents, petroleum and used oils: recycling initiatives for acetone, paint thinner, engine oil, metalworking fluids, hydraulic fluids, & refrigerator oil.
- **Processing** the waste to recover or regenerate a usable product: includes collecting vapor from dry-cleaning operations, turning it back into liquid, and reusing the liquid to clean more clothes

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Source Reduction Strategies

Reuse/Recycling: Batch Distillation

Batch Distillation Units

Can maximize productivity which maximizes peak load for the recovery system and the waste disposal process.

Source Reduction Strategies

Reuse/Recycling: On-Site Distillation

Large Constant Feed Units

Can decrease disposal costs and enhance recovery and reuse of the product.

Mobile Distillation Units

Source Reduction Strategies

Reuse/Recycling: Used Oil

Used Oil Recovery for REUSE on-site.

Mobile unit is ideal for areas with large square footage.

Source Reduction Strategies

Recycling Station

Keeping Staff Involved

Source Reduction Strategies

Recycling Examples

When mercury is recycled from old equipment like switches, it can be used in new products that still require mercury.

Recycling of mercury has been so successful that there is now enough recycled mercury in the U.S. that manufacturers do not need to use new mercury from mines!

Source Reduction Strategies

Inventory Control

Failure of QA/QC Inventory

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Source Reduction Strategies

Preventative Maintenance (PM)

24/7! Setting Your Business up for Success.

Source Reduction Strategies

Improved Parts Inspections

Conduct Routine PM on Equipment

Busted Line for a Coating Tank =
Manufacturing Down Time

Source Reduction Strategies

Process Changes

Identify processes and generation points

- Examine each waste generating process

- Determine all points of waste generation
- Identify products used in the process (Review SDS)
- Identify exit points from the process

Is Technology Available & Feasible?

Consider the following:

- Do changes improve worker safety?
- Do changes improve production?
- Do changes significantly reduce waste or simply transfer to a different media?

Are the Changes Cost Effective?

Consider the following:

- Changes -vs.- current practice
- Look at multiple aspects
  - Reduced toxicity
  - Reduced waste disposal costs
  - Reduced product costs
  - Reduced training costs

Remember, a good Waste Minimization Program improves your product, keeps your Staff safe, minimizes environmental impacts and potentially saves your Facility $.

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Source Reduction Strategies

Process Changes – Upgraded Processes

An updated Pad-Printing Operation decreased waste ink and produced a better product.

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Source Reduction Strategies

Process Changes

A water-based electro-deposition system replaced a traditional spray booth.

A powder painting system can also be substituted for a traditional paint booth.

Systems such as these can often segregate product in order to prolong its productivity prior to entry into the HW Stream.

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Source Reduction Strategies

Waste Audit

The Waste Audit is an in-plant analysis of each operation generating waste.

- Good operating practices
- Input substitution or input materials modification
- Technology modification
- Closed-loop recycling
- Product substitution

Audits help identify areas for improvement.

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Source Reduction Strategies

Using Non-Hazardous Products

An eastern NC Boat manufacturer introduced a **biodegradable plant-based ester (non-hazardous)** into all areas of manufacturing which eliminated all acetone (hazardous/solvent) usage at the facility: Poly-Chem Acra Strip 600 Composite Resin Remover.

In less than 2-years they were able to renotify from a LQG to a SQG and are actually a “Not-A-Generator” of HW with the exception of tank clean-out events once every couple of years.

Source Reduction Strategies

Using Non-Hazardous Products

An eastern NC Apparel Print Shop introduced a non-hazardous absorbent into all areas of manufacturing which eliminated traditional hazardous absorbents used in the industry.

The facility now utilizes an **organic absorbent** ("Sgreen® Stuff Green Chemicals) which contains no hazardous ingredients. The absorbent is an eco-friendly (bio-degradable) water-based dehazer, degreaser and abrader. The product shifts difficult hazed images out of the printing screen. It also abrades the screen in preparation for the next print job.

The Owner stated that his business model chose to incorporate the eco-friendly product versus other hazardous absorbents utilized throughout the printing industry in order to be proactive regarding impacts to both human health and the environment.

The Business has **no** hazardous waste streams!

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Source Reduction Strategies

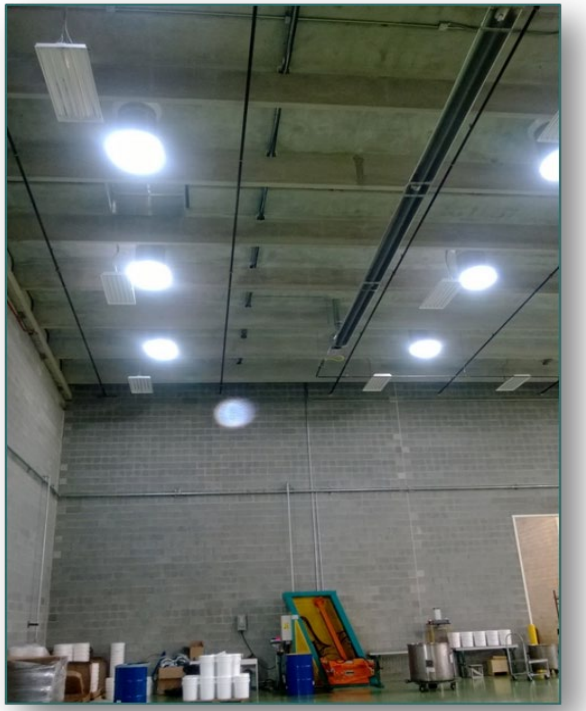
Minimize Resource Usage

Includes Alternative Lighting Strategies

Facilities continue to phase-in alternative lighting strategies. From traditional fluorescent lamps to LED (light-emitting diode) systems to ……

Source Reduction Strategies

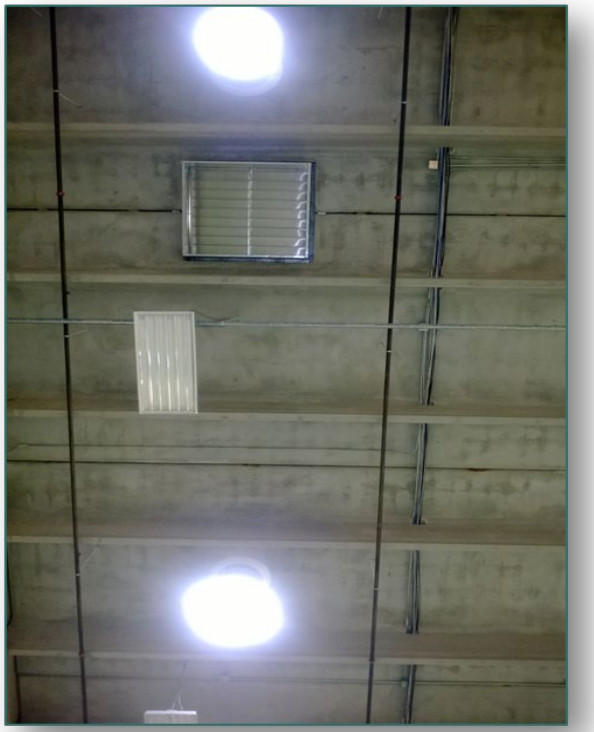
Minimize Resource Usage



Tubular

Sky

Lights



All fluorescent light fixtures are **off**.

Light source is strictly **solar**.

US EPA Waste Minimization Avenues

Roads to Success!

Sustainable Materials Management (SMM)

Waste Wise

Priority Chemicals List

Lean @ EPA

Life Cycle Assessment

Safe Choice Program

Sustainable Materials Management
US EPA

- **Sustainable Materials Management** is the **focus** of US EPA Waste Minimization efforts.

- The use & reuse of materials in the most **Productive & Sustainable** way across the entire life cycle (from point of resource extraction through material disposal: Cradle-to-Grave).

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Sustainable Materials Management

US EPA

Focuses on Beneficial use of industrial materials

- Examples of practical recycling applications include:
  - Concrete and asphalt crushed and used as an aggregate in pavements or as structural fill;
  - Slag, and spent foundry sand recycled in concrete, road embankments, and flowable fill;
  - Coal ash used in the manufacture of cement and ceiling tiles.

Sustainable Materials Management – Waste Wise

US EPA

Waste Wise Members demonstrate how they:

- Reduce Waste;
- Practice Environmental Stewardship;
- Incorporate sustainable materials management into their waste-handling processes.

Preserving Resources, Preventing Waste

The program utilizes the Sustainable Materials Management Data System which is a systematic reporting tool to track & report waste generation & reduction activities which enables you to track and standardize waste management data for your entire operation.

https://www.epa.gov/smm/wastewise

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Priority Chemicals List

US EPA

Focused efforts on **reducing** Priority Chemicals found in products and wastes by finding ways to **eliminate or reduce** their use in production (and/or at the source). Otherwise, recovering and recycling efforts are pursued.

US EPA's Priority Chemicals List

28 Organic Chemicals and Chemical Compounds

- 1,2,4-Trichlorobenzene
- 1,2,4,5-Tetrachlorobenzene
- 2,4,5-Trichlorophenol
- 4-Bromophenyl Phenyl Ether
- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzo (g,h,i) Perylene
- Dibenzofuran
- Dioxins/Furans
- Endosulfan, Alpha & Beta
- Fluorene
- Heptachlor & Heptachlor Epoxide
- Hexachlorobenzene
- Hexachlorobutadiene
- Hexachlorocyclohexane, Gamma
- Hexachloroethane
- Methoxychlor
- Naphthalene
- Polycyclic Aromatic Hydrocarbons Group
- Polychlorinated Biphenyls
- Pendimethalin
- Pentachlorobenzene
- Pentachloronitrobenzene
- Pentachlorophenol
- Phenanthrene
- Pyrene
- Trifluralin

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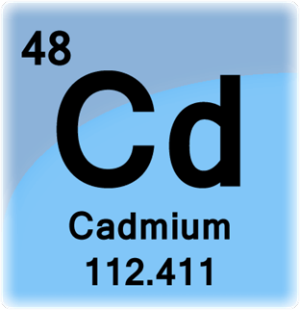
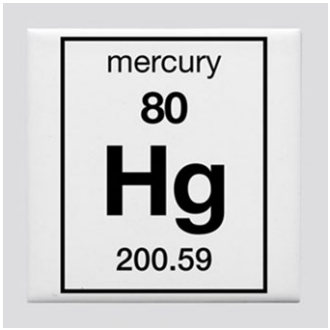
US EPA's Priority Chemicals List

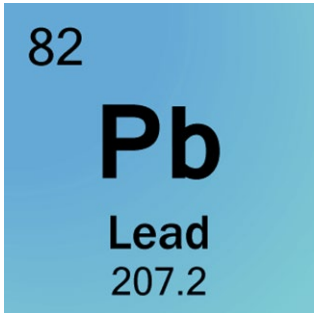
3 Metals and Metal Compounds

Can Trigger RCRA's Toxicity Characteristic Criteria

(Meaning the waste streams they are found in must be managed under **RCRA Hazardous Waste Regulations**)







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Lean @ EPA: Manufacturing

US EPA

- **Lean Manufacturing** is a business model and collection of methods that help eliminate waste while delivering quality products on time and at least cost.

- **Lean Manufacturing** means to **create** or **maximize** value for customers with **fewer resources** (site specific needs).

- **https://www.epa.gov/lean**

Lean @ EPA: Government

US EPA

Lean Government initiatives help:

- Identify and eliminate waste in programmatic and operational processes
- Improve efficiency and effectiveness
- Improve the quality, transparency and speed of their processes

https://www.epa.gov/lean

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Life Cycle Assessment (LCA)

US EPA

LCA is a technique to assess the environmental aspects and potential impacts associated with a product, process or service, by:

- **Compiling** an inventory of relevant energy & material inputs and environmental releases;
- **Evaluating** the potential environmental impacts associated with identified inputs & releases;
- **Interpreting** the results to help you make a more informed decision (site specific needs).

https://www.epa.gov/saferchoice/find-safer-choices-use-your-community

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Life Cycle Assessment (LCA)

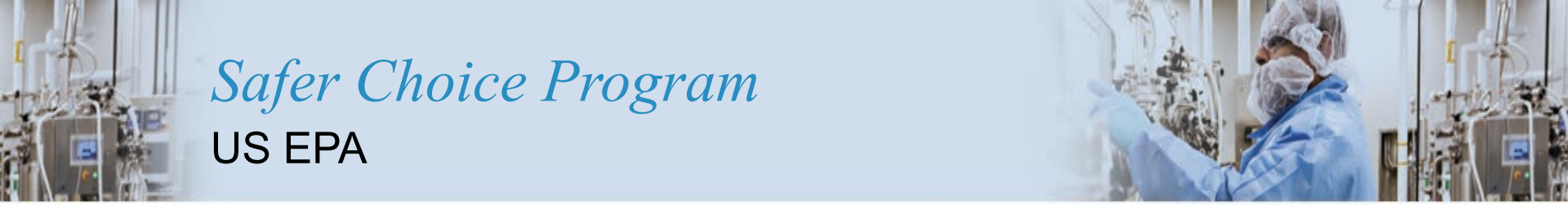
US EPA

Life Cycle Assessments allow businesses to make product improvements through environmentally sound process, material, and design choices; which include:

- Desktop Computer Displays
- Lead-Free Solder in Electronics
- Lithium-Ion Batteries and Nanotechnology for Electric Vehicles
- Wire and Cable Insulation and Jacketing

Safer Choice Program

US EPA



- Helps consumers and commercial buyers find safer products;
- Identifies products that perform well;
- Identifies products that are safe for human health and the environment.

Replaced the previous “Design for the Environment” program/label on March 04, 2015.

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Safer Choice Program

US EPA

The Safer Chemical Ingredient List Includes:
Chelating Agents, Defoamers, Polymers, Processing Aids & Additives, Solvents, Specialized Industrial Chemicals, Surfactants, Degreasers and more …..

User-Friendly/Easy to Navigate: Grouped by Functional-Use Class

http://www2.epa.gov/saferchoice/safer-ingredients

NORTH CAROLINA Department of Environmental Quality

North Carolina
Department of Environmental Quality
Division of Waste Management - Hazardous Waste Section

The primary purpose of the **Division of Waste Management (DWM)** is to protect public health and the environment by assuring that solid and hazardous wastes and underground storage tanks are managed properly, and that existing contamination is cleaned up. This is accomplished through the Hazardous Waste, Solid Waste, Superfund, and Underground Storage Tank Programs. In addition, the Brownfields Program promotes redevelopment of abandoned, idle and/or under-utilized sites.

https://deq.nc.gov/about/divisions/waste-management

The primary purpose of the **Hazardous Waste Section** is to prevent and reduce releases of hazardous substances and clean up contaminated sites.

The **Hazardous Waste Section** ensures the safe management of hazardous waste in North Carolina. The staff applies the adopted federal rules that incorporate the Resource Conservation and Recovery Act requirements and additional state rules.

https://deq.nc.gov/about/divisions/waste-management/hw

North Carolina Department of Environmental Quality
Division of Waste Management
Hazardous Waste Section - Compliance Branch

REGIONAL INSPECTOR MAP

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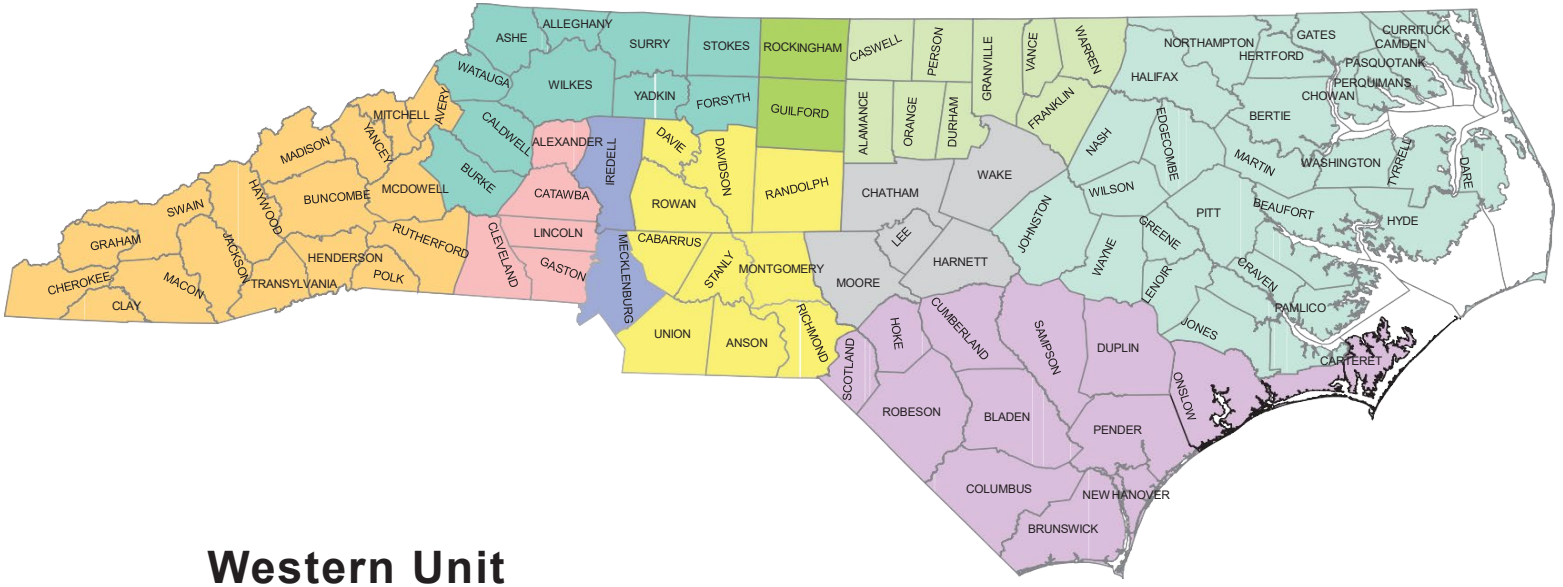

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Updated 4/15/2019

Thank You for Your Efforts!

"The difference between try and triumph is a little umph." – Anonymous

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