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Waste Minimization

Waste Minimization

- The use of **source reduction and/or recycling methods** prior to energy recovery, treatment, or disposal of waste(s).
- Any action that reduces the amount and/or toxicity of chemical wastes that must be shipped off-site for disposal as hazardous waste.

*If you are a **LQG** or **SQG**, **40 CFR 262.27** requires you to demonstrate some form of waste minimization activity, depending on your generator status.

↑ You agree to this when signing the manifest ↑

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Waste Minimization

LQG/SQG; Page 67

Hazardous Waste Manifest Certification Statements

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** of the 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."

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Waste Minimization Plan

- Best way to demonstrate compliance is to maintain a written waste minimization plan
- If no written plan is maintained, be prepared to fully **explain** your waste minimization activities during the inspection process. At a minimum, provide a written policy statement.



Written example on Page 72 of Manual





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Waste Minimization & Biennial Report

*LQGs

The Biennial Report (LQGs) 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

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Waste Minimization **does not** include:

- Waste Treatment:
 - Processes designed to change the physical, chemical, or biological composition of waste streams
- Energy Recovery
- Disposal of Waste
- Dilution for Toxicity Reduction (**illegal** per RCRA!)

§268.3 Dilution prohibited as a substitute for treatment.

(a) Except as provided in paragraph (b) of this section, no generator, transporter, handler, or owner or operator of a treatment, storage, or disposal facility shall in any way dilute a restricted waste or the residual from treatment of a restricted waste as a substitute for adequate treatment to achieve compliance with subpart D of this part, to circumvent the effective date of a prohibition in subpart C of this part, to otherwise avoid a prohibition in subpart C of this part, or to circumvent a land disposal prohibition imposed by RCRA section 3004.

(b) Dilution of waste that is hazardous only because they exhibit a characteristic in treatment systems which include land-based units which treat waste, subsequently discharged to a water of the United States pursuant to a permit issued under section 402 of the Clean Water Act (CWA), or which treat wastes in a CWA-equivalent treatment system, or which treat wastes for the purpose of preventing ground water contamination under section 307 of the CWA is not impermissible dilution for purposes of this section unless a method other than DEACT has been specified in §268.40 as the treatment standard, or unless the waste is a 0103 reactive inorganic inorganic or inorganic waste.

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Benefits of Waste Minimization
Reductions

Reduces waste generation and costs through:


- Raw material and product losses (expired materials)
- Raw material purchase costs (purchase only what is needed)
- Waste management recordkeeping/paperwork burden
- Waste management costs (time & shipping = \$\$\$)
- Workplace accidents/exposure
- Potential compliance issues




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Waste Minimization Practices

- Source Reduction
- Training Program
- Housekeeping
- Procurement Strategies
- Recycling
- Manufacturing Processes




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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. Examples include:



- **Reformulating or redesigning products**, ex: lead free PVC compounds (lead in PVC occurred in US; as recent as 2015 in Europe).
- **Using less-toxic feedstocks**, ex: lead-free solder in manufacturing
- **Improving work practices**, ex: rotating stock/ingredients to prevent expiration



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Source Reduction Strategies
Reducing Your Waste Generation

- Waste audits
- Personnel training
- Inventory control
- Reuse/recycling
- Preventative maintenance
- Process changes
- Use of less-hazardous/non-hazardous products/components






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Source Reduction Strategies
Waste Audit

The Waste Audit is an in-house analysis of operations generating waste.



- **Raw materials/cleaning substitutions**
 - Ingredient changes
 - Solvent substitutions
- **Technology modification**
 - Powder coat vs. conventional spray
 - Water based
- **Closed-loop recycling**
 - Distillation

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Source Reduction Strategies
Personnel Training

- All personnel with hazardous waste management responsibilities should receive thorough introductory and refresher training to ensure that proper procedures are followed to comply with RCRA regulations.
- Trained personnel =>
 - Proper waste management=>
 - Reduced exposure/waste generation

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Source Reduction Strategies
Housekeeping

Good housekeeping helps prevent product loss and subsequent waste management costs.

Measures include:

- Procurement strategies
- Proper storage practices
- Handling & spill preparedness
- Disposal and training

What's the plan?




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Source Reduction Strategies
Procurement

Procurement strategies begin with evaluating purchasing practices:

- Track material use and needs.
- Establish a procurement schedule.
- Check vendors' policies on "buy-backs" / returns, material guarantees, etc.
- In-house examination of raw materials to determine usability.
 - Has it really "expired"?




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Source Reduction Strategies
Recycling Examples

Alternate Uses Include:

- **Direct use** - an ingredient in a product or substitute product
- **Recovery and/or purification** - spent solvents, petroleum and used oils- ex: recycling solvents/thinners, engine oil, metalworking fluids, hydraulic fluids, etc., to recover usable components.

These activities may be RCRA regulated. Be sure to understand the processes and any applicable exclusions or exemptions.



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Source Reduction Strategies
Reuse/Recycling: Batch Distillation

Batch Distillation Units can maximize productivity while minimizing the quantity of hazardous waste generated.





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Source Reduction Strategies
Reuse/Recycling: On-Site Distillation

Permanent Constant Feed Units **Mobile/Contractor Distillation Units**




... can lower disposal costs and enhance recovery and reuse of the product.




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Source Reduction Strategies
Recycling Examples


When mercury is removed from switches, gauges, electronics, dental amalgam, etc., it can be recycled for use in new products that still require mercury. See www.epa.gov/mercury

The leading domestic end uses* of mercury and mercury compounds:

- Dental amalgam (43%)
- Relays, sensors, switches, & valves (41%)
- Bulbs, lamps, & lighting (8%)
- Formulated products (buffers, catalysts, fixatives, & vaccination uses) (7%)
- Batteries & other end uses (1%)



*U.S. Geological Survey, Mineral Commodity Summaries, January 2022
<https://pubs.usgs.gov/periodicals/mcs2022/mcs2022-mercury.pdf>



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Source Reduction Strategies
Inventory Control



Failure of QA/QC inventory

.. is it?



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Source Reduction Strategies
Preventative Maintenance - Inspections



Conduct routine PM on equipment

Equipment failure =
waste generation,
potential exposure, &
lost production



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Source Reduction Strategies
Process Changes

Consider a process change
Consider the following:


- Changes versus current practice
- Look at multiple aspects
 - Reduced toxicity
 - Reduced waste disposal costs
 - Reduced product/ingredient costs
 - Reduced training costs




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Source Reduction Strategies
Process Changes

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



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





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Source Reduction Strategies
Product Substitution Example

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


Less than two years later, it was able to renotify from a LQG to a SQG and operate as a Very Small Quantity Generator of HW apart from tank clean-out events once every few years.



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US EPA Safer Choice Program Link

<https://www.epa.gov/saferchoice>



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US EPA Safer Choice Program




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

Find Safer Choice-Certified Products

By Company or Product Search

All Purpose Cleaners Car Care Products
 Dish Soaps Floor Cleaners
 Laundry Products Tub and Tile Cleaners



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US EPA Safer Choice Program
<https://www.epa.gov/saferchoice/products#sector=Business>


Search Products that Meet the Safer Choice Standard

Search Safer Choice-Certified Products

Product or Company Name (Optional) States

Show only: Fragrance-free products Products with variable rates

Product Type (Optional)



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Source Reduction Strategies
 Minimize Resource Usage

Sky Lights



All fluorescent light fixtures are off.
 The light source is entirely solar.



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US EPA Sustainable Materials Management

Sustainable Materials Management (SMM) 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

➤ By examining how materials are used throughout their life cycle, the SMM approach seeks to:

- Use materials in the most productive way with an emphasis on using less.
- Reduce waste chemicals and environmental impacts throughout the product's life cycle.
- Assure we have sufficient resources to meet current and future needs.

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Sustainable Materials Management
Product Design

The US EPA has emphasized that by looking at a product's life cycle, we can find new opportunities to reduce environmental impacts, conserve resources, and reduce costs.

For example, re-designing a product to:

- Manufacture using different, fewer, less toxic and more durable materials.
- Have a useful end-of-life and recyclability.
- Develop an ongoing relationship between manufacturer and customers to ensure best use of the product, its maintenance, and return at end-of-life.

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NCDEQ Resources

- NC Tax Certification Program
- Division of Environmental Assistance & Customer Service (DEACS)
- Environmental Stewardship Initiative (ESI)




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NC Tax Certification Program Page 74

North Carolina offers a tax exemption on equipment and facilities used **exclusively** for recycling and resource recovery.

Tax Certification Program Rules [15A NCAC 13B Section 1500](#)
<https://www.deq.nc.gov/about/divisions/waste-management/solid-waste-section/applications-solid-waste-permits-and-approvals/tax-certification-program>


15A NCAC 13B .1501 RESOURCE RECOVERING FACILITIES
 (a) A resource recovering facility is a building, or buildings, or parts thereof, and includes any equipment exclusively and integrally used therein for obtaining material or energy resources from solid waste. The facility also includes land occupied by the buildings and equipment.
 (b) Facilities used to collect, sort, or otherwise prepare solid waste for reuse or recycling are resource recovering facilities.
 (c) Incidental or supportive facilities and equipment as defined in 1506(a) of this Section do not qualify for special tax treatment as resource recovering facilities.



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Tax Certification Program
Solid Waste Section

- <https://www.deq.nc.gov/about/divisions/waste-management/solid-waste-section/applications-solid-waste-permits-and-approvals/tax-certification-program>



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NC Tax Certification Assistance

For questions about Tax Certification applications & eligibility: **Chris Hollinger, Compliance Officer**
Solid Waste Section
Phone: 919-707-8284
Chris.Hollinger@deq.nc.gov


<https://edocs.deq.nc.gov/Forms/swtaxcertification>




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Division of Environmental Assistance & Customer Service (DEACS)


- **Non-regulatory** customer service to broaden the understanding of compliance and permitting programs.
- Can assist with communication between your facility & other DEQ agencies/programs.



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DEACS Link

<https://www.deq.nc.gov/about/divisions/environmental-assistance-and-customer-service/about-deacs>



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Division of Environmental Assistance & Customer Service (DEACS)

Non-Regulatory - Pollution Prevention Assistance

Waste Production Partners
RECYCLE RIGHT
Environmental Stewardship

Encourage Efficiency, Support Recycling, Promote Economic Growth and Navigate Permitting

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Division of Environmental Assistance & Customer Service (DEACS)

DEACS helps create economic growth by promoting recycling, material management programs, and the expansion of recycling infrastructures.

 Programs Offered Support for businesses, local governments, and others	 General Recycling Information Recycling e-waste materials, textiles, and campaigns	 Directories and Maps Recycling market information and tools
 Organize Recycling and Compost Learn about program recycling, reuse, resources and initiatives	 Data, Reports and Publications Take a closer look at the state's efforts regarding solid waste and business development	 Links Other resources, agencies and organizations

<https://deq.nc.gov/conservation/recycling>

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Environmental Stewardship Initiative (ESI)

PEER-TO-PEER PROMOTION OF ENVIRONMENTAL EXCELLENCE

- DEQ **recognition** and leadership program
- **Free and voluntary**
- Promotes **outstanding environmental performance and networking**
- Support going beyond compliance by **conserving** natural resources and resulting in **economic benefits**
- Grown from 28 members in 2002 to 106 members at 210 sites

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NC Environmental Stewardship Initiative


ESI invites organizations to partner with the State in reducing environmental impacts from all media, which includes:

- Hazardous & Solid Waste Reduction
- Energy Usage Reduction
- Wastewater Reduction
- Water Conservation
- Air Quality Improvements

ESI Elements Include:

- Technical and Compliance Assistance
- Waste, Energy, Water Assessments
- Personalized On-site Environmental Management Systems (EMS) Assistance
- Waste Sort Assistance
- Networking Opportunities
- Dedicated Coach/DEQ Contact
- Recognition Awards/Marketing

Waste minimization planning includes multiple environmental factors, not just hazardous waste management, as part of organizations' pollution prevention strategies.



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ESI Member Results

2022 ESI Members Results

20 YEARS OF ESI MEMBER-REPORTED RESULTS

WATER REDUCTIONS: 15 BILLION GALLONS (2019-2022), 7.4 BILLION GALLONS (2019-2022)

WASTE REDUCTIONS: 4.2 TONS (2019-2022), 3.9 TONS (2019-2022)

ENERGY REDUCTIONS: 87 MWh (2019-2022)

AIR EMISSION REDUCTIONS: 208 TONS (2019-2022), 9.5 TONS (2019-2022)

COST SAVINGS: \$102,791,600 (2019-2022)

Reductions	Value	Units
Air Emissions	142	Tons
Hazardous waste	191	Tons
Landfilled waste	3,577	Tons
Wastewater Pollutants	8,985	Tons
Greenhouse Gas Emissions*	73,852	Metric Tons CO ₂ e
Material Consumption	185,891	Tons
Energy	1,294,602	MWh
Wastewater Volume	98,841,151	Gallons
Water Use	151,764,223	Gallons


Reuse	Value	Units
Business Recovery**	61,125	Tons
Total Recycled Volume	126,125	Tons

\$5,396,288
Total Cost Savings

*Indirect not reported in energy reductions
**Category limited for compost/mulch related goals

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ESI 20th Anniversary Story map



N.C. Environmental Stewardship Initiative's 20th Anniversary

120 episodes: 20 years of supporting and encouraging business environmental performance

Access the ESI story map [here](https://storymaps.arcgis.com/stories/f9061f580273430fb07714df691ff296?header)
(<https://storymaps.arcgis.com/stories/f9061f580273430fb07714df691ff296?header>)

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ESI 20th Anniversary Link

<https://storymaps.arcgis.com/stories/f9061f580273430fb07714dfd91ff296?header>



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ESI Members



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QUESTIONS?

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QUESTIONS?

QUESTIONS?

QUESTIONS?

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Picture References

- Slide 4 - <https://www.epa.gov/p2>
- Slide 27 - <https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy>
- Slide 28 - <https://www.epa.gov/smm/sustainable-materials-management-basics>
- Slide 29 - <http://www.spdpsolutions.com/files/3514/3837/595/sustainability.jpg>

