



Waste Management Plans – Developing Sustainable Waste Programs

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Environmental Health & Safety Consulting Services

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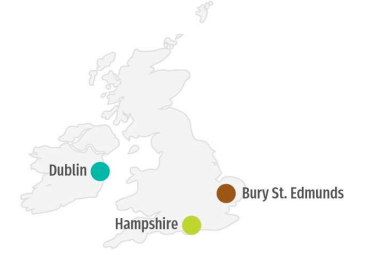
North America



- EHS Consulting
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- Advent Engineering Life Science Solutions
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- Vision Environment
- WorkingBuildings
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Europe

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Asia

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Australia

Queensland / New South Wales





Course Objectives

1. Develop a framework for a sustainable waste program
2. Discuss best practices for a waste management plan
3. Explore sustainable waste practices
4. Address common questions and misconceptions

Waste Management Plans

Put Simply, All Waste Generators Must...

- ▶ **Identify** all discarded materials at the facility
 - ▶ **Classify** discarded materials as non-hazardous, hazardous, acute hazardous waste, universal waste or used oil
 - Waste determination!
 - ▶ **Count** how much hazardous waste or acute hazardous waste is generated each calendar month
 - ▶ Comply with the requirements applicable to the respective waste **generator category** (e.g., Very Small, Small, Large)
 - ▶ Comply with any additional **more stringent state waste regulations**
-



Why prepare a written Waste Management Plan?

- ▶ Compliance with applicable hazardous waste regulations, state-specific waste regulations and document sustainability initiatives.
- ▶ Identifies key regulatory requirements, best management practices and overall management systems.
- ▶ Tool to support sustainable waste management practices.
- ▶ Supports Management of Change and institutional knowledge - when employees change over, the WMP ensures consistent (and compliant) management of hazardous wastes

- An educational tool
- A recordkeeping directory
- A procedure reference
- A best practice guide
- An audit preparation tool

- ↓ Lowers waste disposal costs
- ↓ Decrease Liability
- ↓ Decreases waste volumes
- ↑ Encourages reuse, reclamation and recycling
- ↑ Improves sustainability metrics
- ↑ Improves regulatory inspection outcomes

Decrease Risk during Agency Inspections

- ▶ A Waste Management Plan can identify risks and decrease them through thoughtful documentation and forward-thinking planning
- ▶ A Waste Management Plan can clarify grey areas of RCRA for facility personnel
- ▶ Demonstrates a culture of compliance
- ▶ Demonstrates affirmative environmental management vs. crisis management
- ▶ **PROACTIVE VS REACTIVE**
 - **“Perception” to agency inspectors!**



The image shows a risk assessment matrix on a clipboard. The matrix is titled "Risk Assessment" in red. The columns are labeled "Disaster", "High", "Medium", and "Minimal". The rows are labeled "Probability", "Regularly", "Probable", "Occasional", and "Rarely". The cells contain risk levels: "Critical", "High", "Medium", and "Low". A black pen is resting on the matrix.

Severity	Disaster	High	Medium	Minimal
Probability	Disaster	High	Medium	Minimal
Regularly	Critical	Critical	High	Medium
Probable	Critical	High	Medium	Medium
Occasional	Critical	High	Medium	Low
Rarely	High	Medium	Medium	

Recommended Waste Management Plan Outline

What regulations apply?

Sustainability goals & policies

General facility information

Waste determinations

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Recommended Waste Management Plan Outline

Key HW regulatory requirements

Key UW regulatory requirements

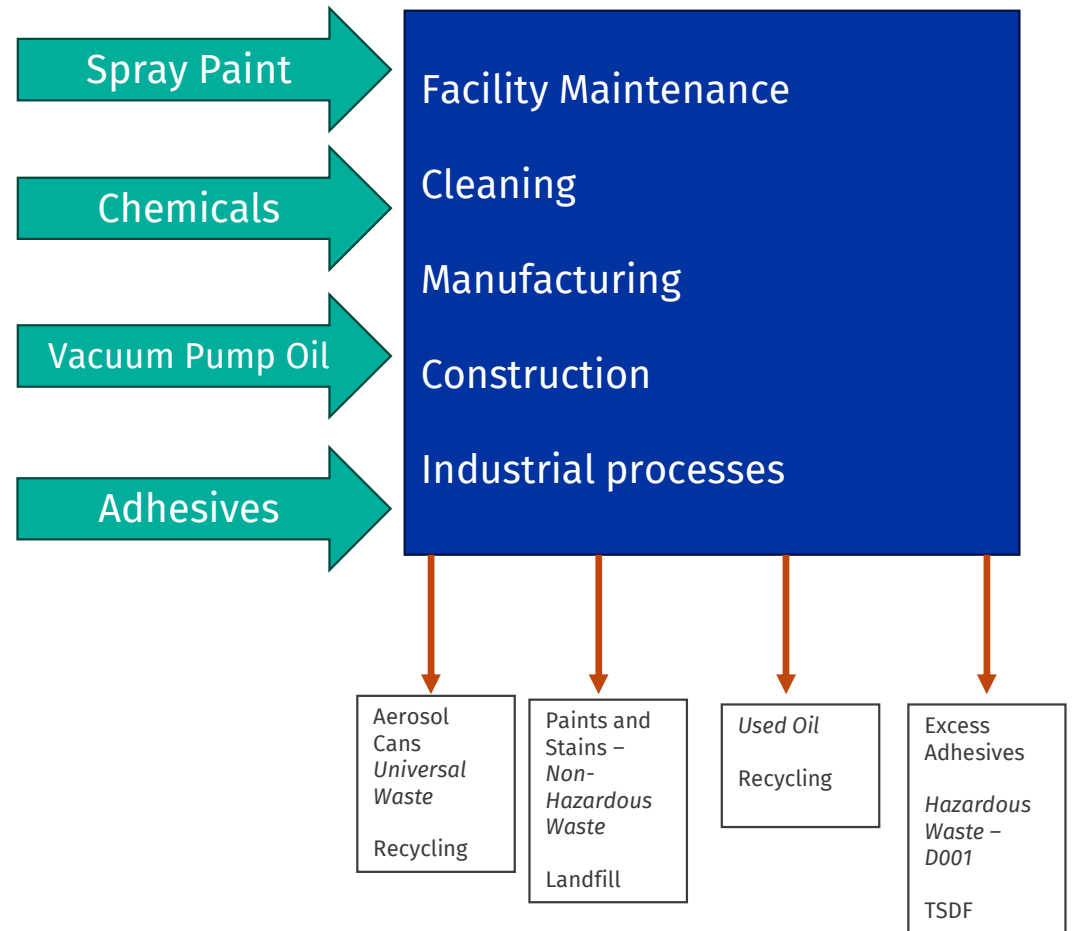
Key used oil regulatory requirements

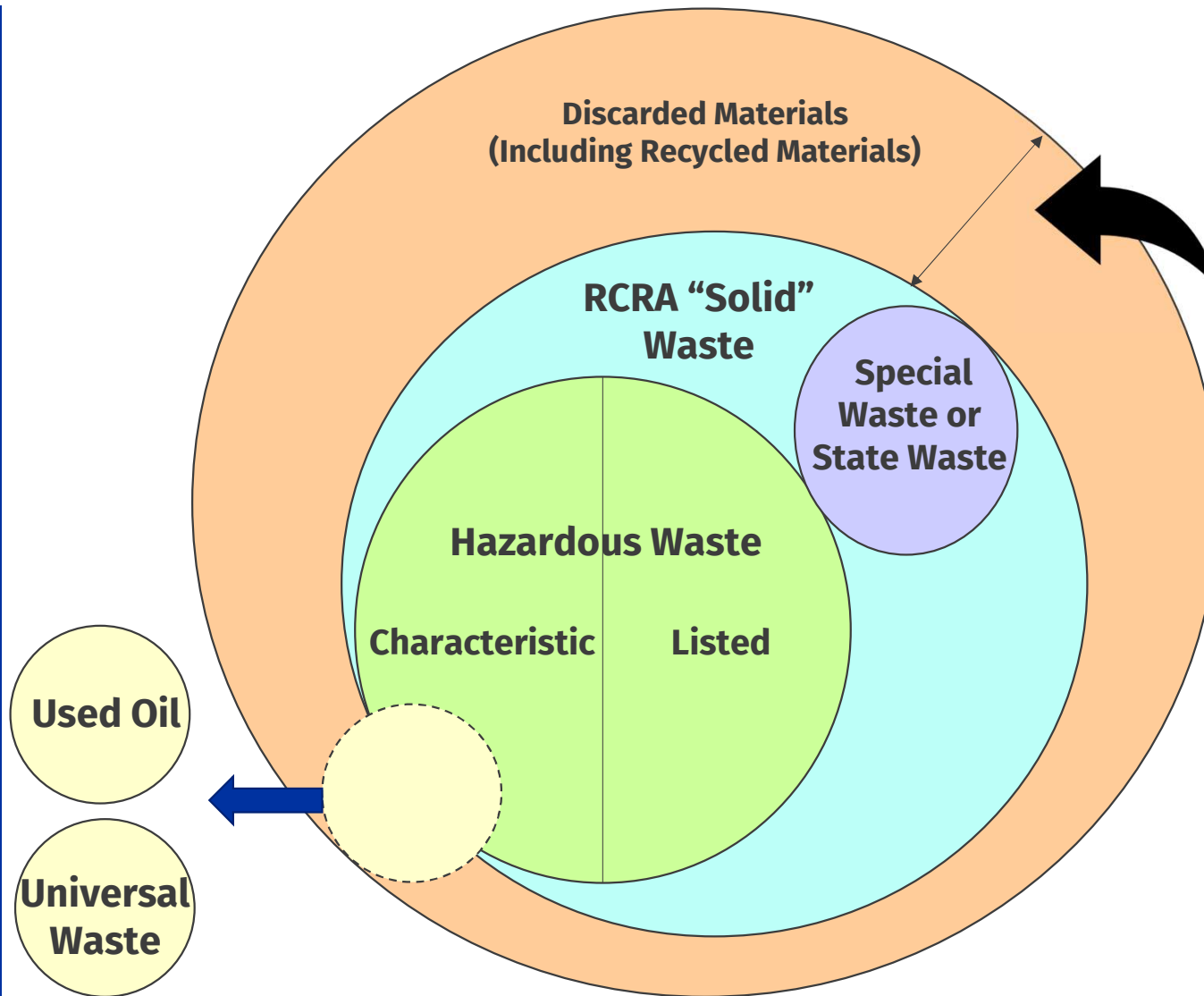
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Key WMP Component: Waste Determinations

Start at the beginning

- ▶ Has the facility generated waste?
- ▶ Where are the waste streams originating?
- ▶ Are wastes being managed and disposed of properly?
- ▶ Is there a comprehensive list that demonstrates which waste streams are hazardous waste and which are not?





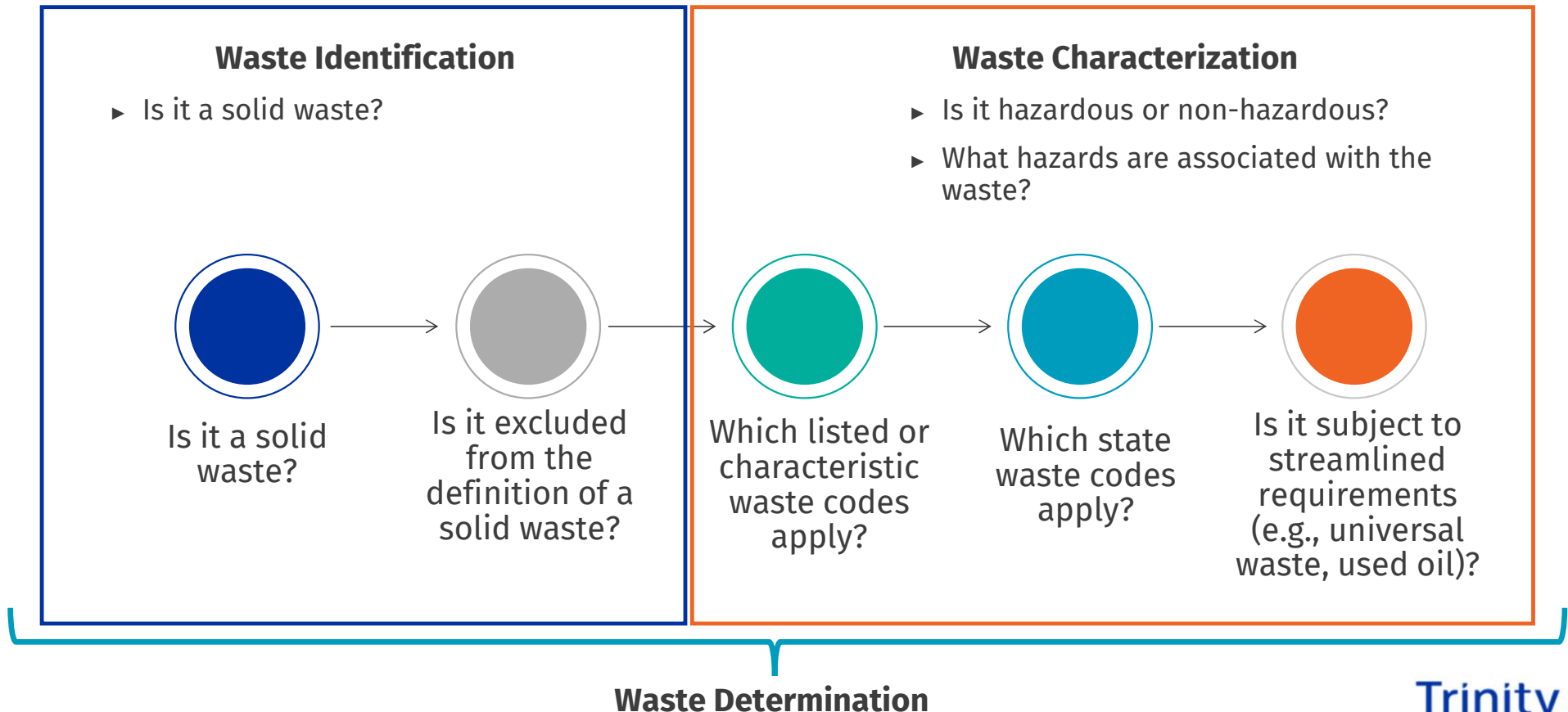
BUT NOT EVERY
DISCARDED MATERIAL IS
REGULATED AS
“HAZARDOUS WASTE”

Discarded materials
excluded from the
“Definition of Solid
Waste”

Examples:

- CWA-regulated wastewater
- Hazardous secondary materials (HSM)

Waste Identification + Characterization = Determination



Waste Stream Profiles

- ▶ Customary for vendors to complete waste profiles
- ▶ Check all profiles completed by the vendor
- ▶ Review profiles annually and when processes and raw materials change
- ▶ Recommend sampling waste streams on a regular basis to validate characterization status (at least every 3 years) – even for non-hazardous waste
- ▶ Do not rely on vendor portals to access waste profiles, have a copy on-site
- ▶ Ensure all waste streams have a waste profile

“Another document that is inadequate by itself is a Waste Profile from a contractor. These forms are often filled out by hazardous waste contractors through interviews with generators and frequently are not supported by any real investigation into the process generating the waste.” – Kansas Department of Health and Environment (BWM TGD HW-2011-G1, Revised 2/21/2020)

Recap on Waste Determination and Characterization

Typical Findings and NOVs

- ▶ Failure to make waste determinations
- ▶ Failure to identify all waste streams
- ▶ Inaccurate waste classification
- ▶ Using out-of-date information (SDS, waste profiles, analytical data)
- ▶ Failure to characterize mixtures of VSQG hazardous and non-hazardous waste
- ▶ Using HSM exemptions but failing to notify EPA or develop required exemption documentation
- ▶ Conducting generator treatment without documenting the exemption
- ▶ Failure to complete a one-time Notice to File for exempted hazardous waste as required in LDR regulations
- ▶ Shipping hazardous waste to an unapproved or unpermitted facility

Make Sure Your Plan Has

- ▶ Waste determination and characterization for all wastes generated at the facility
- ▶ Waste Inventory for all wastes generated at the facility
- ▶ Management of change procedure for when processes change.
- ▶ Required HSM documentation
- ▶ A one-time Notice to File documenting hazardous waste exemptions
- ▶ Documentation that exempt generator treatment is approved by state regulations
- ▶ Hyperlinks or locations of up-to-date SDSs, waste profiles and analytical data
- ▶ Sampling Plan, if required
- ▶ List of company approved waste vendors and contact information

Key WMP Component: Documenting Generator Status

Generator Category Determination

40 CFR 262.13

- ▶ Generator status is determined on a monthly basis and may change from month to month
- ▶ Indiana allows Episodic Generation for temporary status changes
- ▶ **Key question for VSQGs & SQGs: can you prove your generator status?**
 - **Pitfalls:**
 - ◆ **Relying on manifests**
 - ◆ **Excluding satellite accumulation containers**
 - ◆ **Inaccurate waste determinations**

Counting Waste

- ▶ Count hazardous waste only once
- ▶ Count all **hazardous waste** and **acute hazardous** waste in containers and tanks, **except**:
 - Waste that is **exempt** (e.g., properly drained oil filters)
 - Waste that is **treated or recycled immediately without prior storage**
 - **Universal Waste**
 - **Used oil**
 - **Lead-acid batteries** returned to the vendor for reclamation
 - Academic laboratory clean-out of unused chemical waste
 - Pharmaceutical hazardous waste subject to Part 266, Subpart P
 - Co-generator waste counted by your contractor
 - **Episodic event waste if managed in accordance with requirements**



Episodic Event - The WMP should specify what to do if you exceed your threshold.

Planned

Regular Maintenance Tank cleanouts	Short-Term Projects Remove excess chemicals
---------------------------------------	--

- ▶ Notify agency of a planned episodic generation event if a one-time exceedance.
- ▶ If the exceedance will be long-term prepare to transition to the next generator status and notify state agency once transition is complete.

Unplanned

Production Upset Accidental spills	Product recalls Acts of nature (e.g., flood)
---------------------------------------	---

- ▶ Notify agency of an unplanned episodic generation event if a one-time exceedance.
- ▶ If the exceedance occurred within the past three years, seek assistance from your legal department.
- ▶ Prepare to transition to next generator status if long-term and notify state agency when transition is complete.

Recap on Generator Status

Typical Findings and NOVs

- ▶ Generator exceeded monthly threshold level (monthly generation rate or total inventory) at least one month in past three years.
- ▶ Not counting all hazardous waste accumulated towards generator status (e.g., missing satellite accumulation)
- ▶ Spills or manufacturing upsets cause generator status exceedances
- ▶ Using waste shipment quantities instead of waste generation quantities
- ▶ Not considering acute hazardous waste thresholds
- ▶ Not counting co-generator waste
- ▶ Conducting chemical sweeps and exceeding generator status thresholds
- ▶ Failure to complete episodic waste documentation properly
- ▶ Not updating EPA Form 8700-12
- ▶ Waste not shipped within 90/180/270 day thresholds

Make Sure Your Plan Has

- ▶ Robust waste tracking method if SQG or VSQG
- ▶ Episodic waste event instructions
- ▶ Waste ownership agreement with co-generators

Key WMP Component: Container Management

Containers

40 CFR 262.16(b)(2) and 40 CFR 262.17(a)(1)

- ▶ Containers must be closed
- ▶ Leak free and in good condition
- ▶ Managed to prevent a release
- ▶ Compatible with contents
- ▶ Secondary containment for liquids
- ▶ Proper storage area
- ▶ Must have words **Hazardous Waste**
- ▶ Must have indication of hazard
- ▶ Must have accumulation start date (if in central accumulation area)

VSQGs are exempt from this requirement, under 40 CFR 262.14(a) but should consider these provisions as a BMP.



RCRA “Empty” for Containers

40 CFR 261.7



- ▶ Containers must be emptied as much as possible using industry standard methods and then check to see if the container meets the definition of “RCRA-Empty”
- ▶ Non-gaseous or non-acute hazardous waste - no more than:
 - **1-inch** of residue or **3%** by weight for containers of less than **119 gallons**
 - **1-inch** of residue or **0.3%** for containers greater than **119 gallons**
- ▶ Acute hazardous waste containers – triple wash or cleaned by other approved method
- ▶ Gas containers – atmospheric pressure
- ▶ Container may be considered a hazardous waste unless properly emptied

Advance Notice of Proposed Rulemaking (ANPRM)

- ▶ **August 11, 2023** EPA published an ANPRM related to used container management that would drastically change the regulatory landscape for facilities that generate hazardous waste or “empty” chemical containers
- ▶ Based off 2022 drum reconditioner report which explored the end life management of containers
- ▶ Report implies that chronic mismanagement of RCRA empty containers pose an unacceptable risk to human health and the environment



Drum Reconditioner Damage Case Report



Potential Impacts on General Industry

- ▶ Disposal of empty containers would become vastly more expensive and/or cumbersome
- ▶ Drum reconditioners would need RCRA subtitle C permits
- ▶ In order to accomplish some of the achieved goals, revisions may be needed elsewhere in the regulations, adding to regulatory burdens
- ▶ Comment period ended November 22, 2023, EPA will now consider the comments and may amend the rule making
- ▶ **Stay tuned!**



Recap on Container Management

Typical Findings and NOVs

- ▶ Container in central accumulation area (CAA) not marked with start accumulation date
- ▶ Open containers (funnels etc.)
- ▶ Containers not labeled **Hazardous Waste**
- ▶ No indication of hazard label
- ▶ Illegible labels / handwriting
- ▶ Incompatible waste stored in same area
- ▶ Reuse of containers for transport of hazardous waste
- ▶ Label not visible for inspection from aisle way

Make Sure Your Plan Has

- ▶ Container labeling requirements
- ▶ Container dating requirements
- ▶ Container management requirements
- ▶ SAA requirements
- ▶ Container closure instructions
- ▶ Empty container policy for reuse of containers
- ▶ Consider including a map of SAAs and AAs

Key WMP Component: Tank Management

Tank Requirements for LQG

40 CFR 262.17(a)(2) – 40 CFR 265 Subpart J

- ▶ Label “**Hazardous Waste**” + nature of hazard
- ▶ Logs to demonstrate turnover every 90 days
- ▶ Daily inspections
- ▶ **P.E. certified assessment and tank tightness testing**
- ▶ Corrosion protection
- ▶ Secondary containment
- ▶ Spill/overflow prevention
- ▶ Air emission standards



Air Emission Standards for LQGs

40 CFR 265 Subpart AA, BB, CC

- ▶ Subpart AA – **Process vents** associated with distillation, fractionation, thin-film evaporation, solvent extraction, and air or steam stripping that manage hazardous wastes with organic concentrations of **at least 10 ppm(w)**
- ▶ Subpart BB – Leak Detection and Repair (**LDAR**) for **equipment** that contains or contacts hazardous wastes with organic concentrations of at least **10% by weight**
- ▶ Subpart CC – Standards for **containers, tanks, or surface impoundments (500 ppm(w) volatile organic content)**
 - Containers – Level 1 (<119 gals or not in not material service), Level 2, or Level 3 (waste stabilization)
 - Tanks – Level 1 (fixed roof) or Level 2 (other tank options)

Recap on Tanks

Typical Findings and NOVs

- ▶ Waste tank inventory log not maintained to demonstrate tank turnover
- ▶ Inadequate or missing secondary containment for the tank or ancillary equipment
- ▶ Questionable secondary containment integrity
- ▶ Tank assessment not conducted
- ▶ Inadequate corrosion protection
- ▶ Subpart BB and CC requirements not followed

Make Sure Your Plan Has

- ▶ Inspection plan
- ▶ Copy of inspection checklist
- ▶ Tank P.E. assessment, if required
- ▶ RCRA Subpart BB and CC compliance data, if required
- ▶ Description of procedure to demonstrate tank is emptied every 90 days

Key WMP Component: Accumulation Areas

Hazardous Waste Accumulation – 2 Types



▶ Central Accumulation Areas (CAA)

- Accumulation Time Limits - Containers
 - ◆ 90 days for LQG
 - ◆ 180 days for SQG

▶ Satellite Accumulation Area (SAA)

- Near Point of Generation
- 55-gallon limit
- Move container to CAA within 3 calendar days of reaching 55-gallon limit



Recap on Central and Satellite Accumulation Areas

Typical Findings and NOVs

Satellite Accumulation Areas

- ▶ SAA containers not under control of the generator
- ▶ Exceed satellite accumulation limits (55 gallons)
- ▶ Not dating excess waste
- ▶ Not moving excess waste from SAA to CAA within 72 hours
- ▶ Containers attached to laboratory equipment (e.g., GC) not labeled, closed or dated

Central Accumulation Areas

- ▶ Inadequate aisle space
- ▶ No dedicated location for central accumulation area
- ▶ Emergency equipment not available

Make Sure Your Plan Has

- ▶ Procedure for setting up SAA containers
- ▶ Procedure for moving waste from SAA to CAA
- ▶ Site map of CAA and SAA areas
- ▶ List of emergency equipment associated with each SAA and CAA
- ▶ CAA Performance Standards

Key WMP Component: Pre-Transport Requirements

Pre-transport Requirements

40 CFR 262 Subpart C

- ▶ **Confirm** accuracy of hazardous waste manifest
- ▶ **Package** in accordance with 49 CFR 173, 178, 179
- ▶ **Verify** container integrity
- ▶ **Label** each package in accordance with 49 CFR 172
- ▶ **Mark** each package & containers of 119 gallons or less with specific wording
- ▶ **Placard** the transport vehicle or offer placards
- ▶ Hazardous material employees must receive **training once every 3 years**
- ▶ Personnel responsible for preparing drums must be trained on **proper closure techniques** including the manufacturer's instructions and proper wrench



Pre-Transport Checklist Tool

- Review Hazardous Waste Manifest for Accuracy
- Review Land Disposal Restrictions Paperwork for Accuracy
- Ensure DOT approved containers are used
- Ensure all drums have completed hazardous waste labels and an indication of the hazard
 - ◇ Generator Name, address, and EPA ID number
 - ◇ DOT Basic Description
 - ◇ EPA Waste codes
 - ◇ Accumulation start date
 - ◇ Manifest Number

Recap on Pre-Transport

Typical Findings and NOVs

- ▶ Waste container is not properly packaged, closed, labeled, or marked
- ▶ Generator does not offer placards to transporter or have a system to ensure vehicles are properly placarded
- ▶ Manifest completed incorrectly
- ▶ Individuals signing manifests have not received DOT training

Make Sure Your Plan Has

- ▶ Record of DOT training
- ▶ Instructions for reviewing manifests for accuracy
- ▶ Hazardous waste pre-transport checklist
- ▶ Hazardous material placard requirements
- ▶ Reference to drum closure instructions
- ▶ Photograph that show how each package should look when properly prepared for shipment

Key WMP Component: Reporting, Recordkeeping and Hazardous Waste Manifests

EPA ID Number

- ▶ A unique 12-digit identifier beginning with the state abbreviation specific to a site required for SQGs and LQGs
- ▶ When a site changes ownership, the new owner retains the EPA ID number for that site
- ▶ If there are different companies (or divisions of the same company) on the same site, there could be more than one EPA ID number at a site - **EPA cautions that subdivision of waste at one location for the purpose of avoiding regulation is not allowed**
- ▶ Existing EPA ID numbers can be found on EPA's ECHO database (www.echo.epa.gov)
- ▶ **Indiana** uses RCRAInfo
- ▶ **Kentucky** uses state forms and EPA Form 8700-12 [EasiTrack allowed]
- ▶ **Ohio** uses RCRAInfo

Annual Reporting & Recordkeeping

- ▶ Report: **KY Annual (SQG&LQG)** | **IN Annual (SQG&LQG)** | **OH Biennial (LQG)**
- ▶ Due: March 1
- ▶ Report all hazardous waste generated in a calendar year, even when it is managed the next calendar year
- ▶ Report hazardous wastes generated throughout calendar year, even for months when sites does not generate at LQG/SQG-rates
- ▶ Recycling facilities must report wastes that are not stored prior to recycling
- ▶ Don't report waste not counted – *previous slide*

Type of Record	Retention Time
EPA ID Number and Notifications	Active Life
Hazardous Waste Manifests and LDR Notifications	Three Years
Hazardous Waste Determinations, Waste Analysis, Waste Profiles	Three Years
Exception Reports	Three Years
Biennial or Annual Reports	Three Years
Exception Reports	Three Years
Inspection Checklists	Three Years (BMP)
Training Records	Until closure or 3 years after employee termination
Contingency Plan [including Quick Reference Guide Elements]	Active Life
Tank Records, including P.E. certification	Active Life
Episodic Event Records (EPA Approval, dates, details @ event)	Three Years
Export Records	Three Years
VSQG Consolidation Reports and Receipts	Three Years
RCRA Air Emission (AA, BB, CC) Documentation, as applicable	Three Years

Hazardous Waste Manifest

40 CFR 262 Subpart B

- ▶ Shipping paper required by EPA and DOT to ship hazardous waste
- ▶ Both RCRA and DOT regulations must be followed for filling out and retaining hazardous waste manifests.
- ▶ Hazardous waste manifest will serve as the Bill of Lading (BOL) for the shipment
- ▶ Retain one copy of the manifest
- ▶ Waste vendor will complete the manifest and provide it to you for your signature
- ▶ Verify all information is correct before signing it as you are certifying the information via your signature



Must meet all DOT/EPA requirements

Must be signed and dated by a trained person

Recap on Reporting, Recordkeeping and Manifests

Typical Findings and NOVs

- ▶ Incorrect EPA ID number(s) for generator, transporter or TSD
- ▶ Missing or incorrect waste codes on manifest
- ▶ Manifest does not include accurate proper shipping name or does not comply with DOT manifest preparation requirements
- ▶ Manifests not submitted to state agency (if required by state)
- ▶ Failure to submit and/or maintain LDR notification
- ▶ Missing or incomplete LDR documentation
- ▶ LDR information provided is inconsistent with waste characterization
- ▶ Failure to prepare and submit hazardous waste activity reports and maintain copies for three years
- ▶ Inaccurate hazardous waste activity reports

Make Sure Your Plan Has

- ▶ EPA ID number and copy of EPA registration
- ▶ Manifest approval instructions
- ▶ Record retention requirements
- ▶ List of reporting requirements and instructions for accessing state portal (credentials etc.)
- ▶ List of approved hazardous waste vendors and their EPA ID numbers

Key WMP Component: Inspections

Inspection Requirements

40 CFR 262.16(b)(2)(iv) and 40 CFR 262.17(a)(1)(v)



Location of Hazardous Waste	Requirement
Satellite Accumulation	Not Required
Central Accumulation Area LQG 90-day area SQG 180-day area	Weekly (Every Seven Days)
Hazardous Waste Tanks	Every Operating Day – Follow State Requirements

- ▶ Inspections are required even if no waste is present
- ▶ Document all inspections, findings, and corrective actions
- ▶ If inspections are conducted using a mobile device or tablet, ensure all data is uploaded to a central system for easy retrieval during an inspection

Recap on Inspections

Typical Findings and NOVs

- ▶ Weekly container inspections not conducted or not documented
- ▶ Not conducting or not documenting required daily inspections of the tank and equipment
- ▶ Not conducting inspections of emergency response equipment

Make Sure Your Plan Has

- ▶ Blank copies of required container and tank inspection checklist for central accumulation areas
- ▶ Written schedule for inspection of all monitoring equipment, safety and emergency equipment
- ▶ Schedule for container and tank inspections and backup plan for vacations and holidays



Batteries

A device consisting of one or more electrically connected electrochemical cells that are designed to receive, store, and deliver electrical energy.



Pesticides

Recalled, suspended and cancelled pesticides, and unused pesticides that have not been recalled but are collected and managed as part of a waste pesticide collection program.



Mercury Containing Equipment

A device or part of a device (including thermostats but excluding batteries and lamps) that contains elemental mercury integral to its function.



Lamps

The lamp or tube portion of an electric lighting device. Does not include LED lamps.



Aerosol Cans

A non-refillable receptacle containing a gas compressed, liquefied or dissolved under pressure, the sole purpose of which is to expel a liquid, paste, or powder and fitted with a self-closing release device allowing the contents to be ejected by the gas.

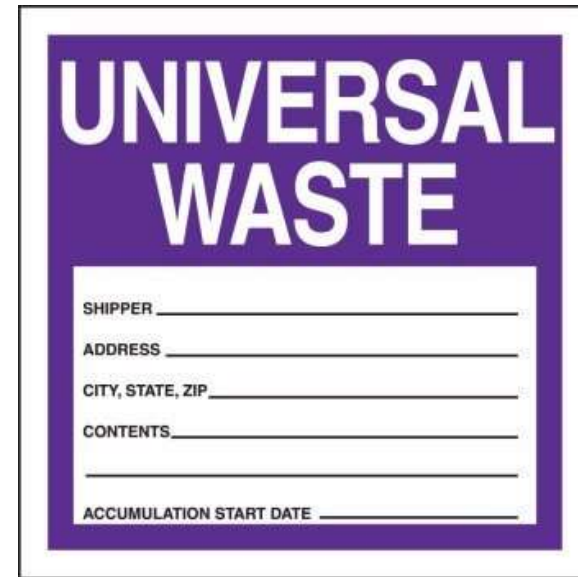
Universal Wastes

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Universal Wastes

40 CFR 273

- ▶ Program to promote collection and recycling of certain widely generated hazardous wastes
- ▶ Generator may choose to manage wastes as hazardous waste or as universal waste
- ▶ Universal wastes do not count towards a site's hazardous waste generator status
- ▶ Less stringent management standards:
 - 1-year onsite accumulation
 - No inspection requirements
 - Manifest not required
 - Keep basic records



A purple rectangular label with white text and lines for information. The top half has the words "UNIVERSAL WASTE" in large, bold, white capital letters. Below this, there are several lines of text with horizontal lines for input: "SHIPPER", "ADDRESS", "CITY, STATE, ZIP", "CONTENTS", and "ACCUMULATION START DATE".

- ▶ **Label**
 - Universal Waste - _____
 - Waste _____
 - Used _____
- ▶ Maintain containers in good condition to prevent breakage or leakage
- ▶ **Close lamp containers** when not adding waste to container

Recap on Universal Waste

Typical Findings and NOVs

- ▶ No system in place to demonstrate compliance with one-year accumulation limit
- ▶ Open universal waste lamp containers when not adding waste lamps to containers
- ▶ Universal waste training does not include emergency procedures
- ▶ No records of shipment for universal waste

Make Sure Your Plan Has

- ▶ Description of universal waste procedures for all universal waste generated
- ▶ Labeling and dating instructions
- ▶ Emergency procedures for universal waste releases
- ▶ Description of system to track accumulation limits if labels are not used

Sustainable Waste Practices



ESG Benefits of a Waste Management Program

- ▶ Credibility
- ▶ Reputation
- ▶ Cost
- ▶ Environmental Health
- ▶ Greenhouse gas reductions



Reference: <https://online.hbs.edu/blog/post/what-is-sustainability-in-business>, <https://www.epa.gov/smm/managing-and-reducing-wastes-guide-commercial-buildings#Benefits>

Waste Minimization Approaches



**Source
Reduction**

**Recycle
And Re-Use**

**Energy
Recovery**

Treatment

Disposal



Improve ESG scores on this end

Recycling and/or beneficial re-use may qualify for applicable state or federal exclusions from hazardous waste regulation

Source Reduction – Typical Approaches

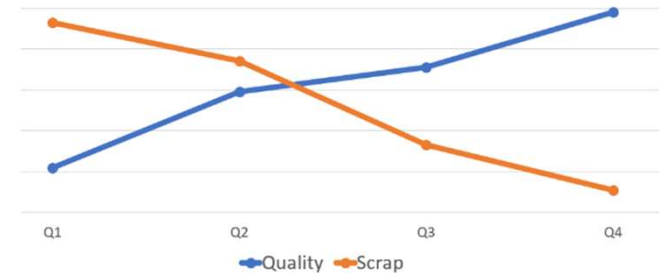
- ▶ Input Changes
- ▶ Operational Improvements
- ▶ Production Process Changes
- ▶ Product Reformulation
- ▶ Administrative Steps



Source Reduction =
Measures that stop the
generating activity at
the source BEFORE the
waste is generated!

Operational Improvements

- ▶ Improve quality and reduce repair and scrap
- ▶ FIFO inventory control
- ▶ Maintain equipment
- ▶ Avoid excess inventory -disposal of obsolete material
- ▶ Temperature control, spoilage,



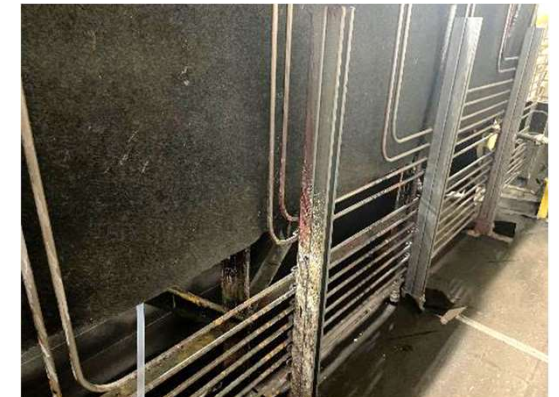
Operational Improvements

- ▶ Change from 2 coat to 1 coat operation, reduced air emissions, paint overspray, energy use, purge solvent generation



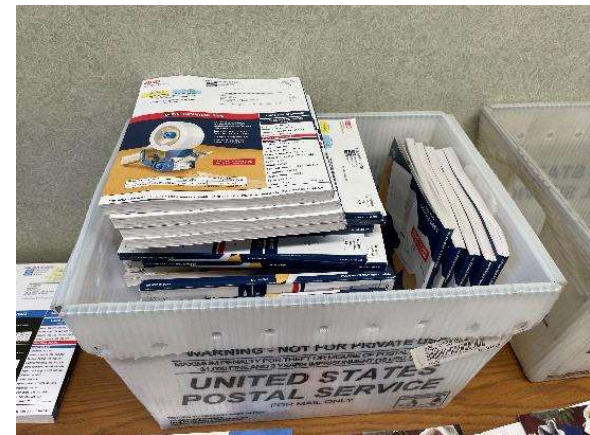
Operational Improvements

- ▶ No residues left in containers
- ▶ Physical cleaning such as agitation or brushing
- ▶ Clean less surface area – reduce the length of pipe to clean



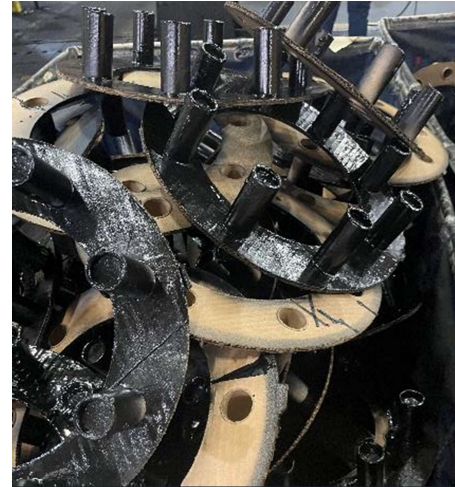
Operational Improvements

- ▶ Stop waste delivered to you
– catalogs, over-packaged
- ▶ Repurpose waste/junk -
exchanges, online auctions,
employee sales, donations,
intra-company



Operational Improvements

- ▶ Reuse items internally or return to supplier
- ▶ Clean in stages – dirty to cleaner stages



Operational Improvements

- ▶ Reformulation to remove specific ingredients – avoid F-listing, TCLP characteristic, HAP listed, etc.
- ▶ Reformulate to reduce nature or volume



Waste Recycling – Typical Approaches

- ▶ Wastewater
- ▶ Solvent(s) Recovery
- ▶ Metal Reclamation
- ▶ Food Waste
- ▶ Paper Waste
- ▶ Used Oil
- ▶ Plastic
- ▶ Batteries
- ▶ E-Wastes



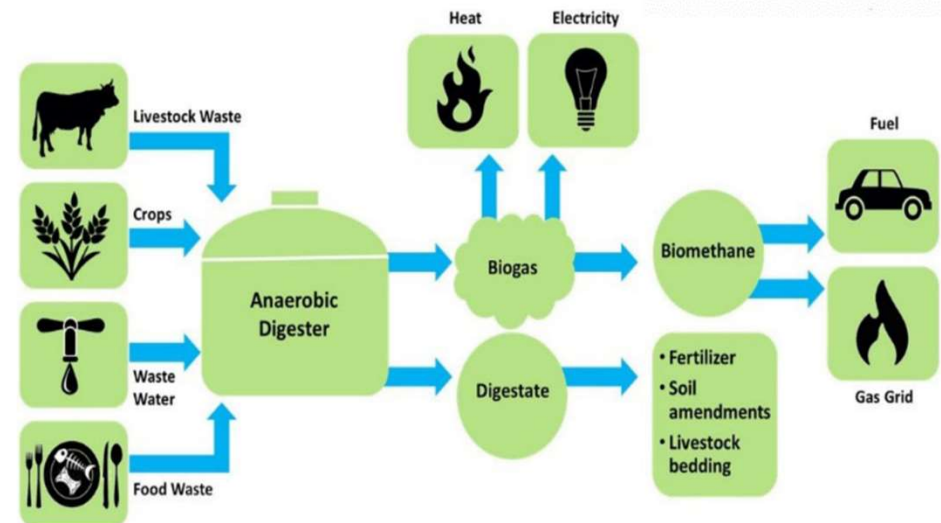
Energy Recovery – Typical Approaches

- ▶ Fuel Blending
- ▶ Waste-to-Energy Facilities
- ▶ Gasification
- ▶ Pyrolysis
- ▶ Anaerobic Digestion
- ▶ Landfill Gas Recovery

Flares into fuel

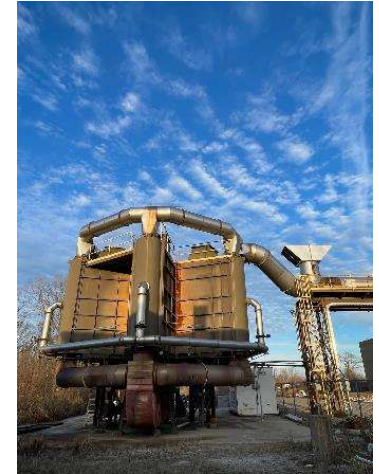


From left photo by Ann Lavery International Truck and Engine Corp. employees Tom Saxton and Tim McDaniel stand in front of an air pollution control device that may be powered by methane from the Transport City Landfill.



Waste Treatment – Typical Approaches

- ▶ Distillation
- ▶ Adsorption
- ▶ Stripping
- ▶ Chemical stabilization
- ▶ Biological processes
- ▶ Evaporation
- ▶ Neutralization
- ▶ Phase separation (filtration, settling, centrifuges, etc.)
- ▶ Thermal or catalytic incineration (for air emissions)

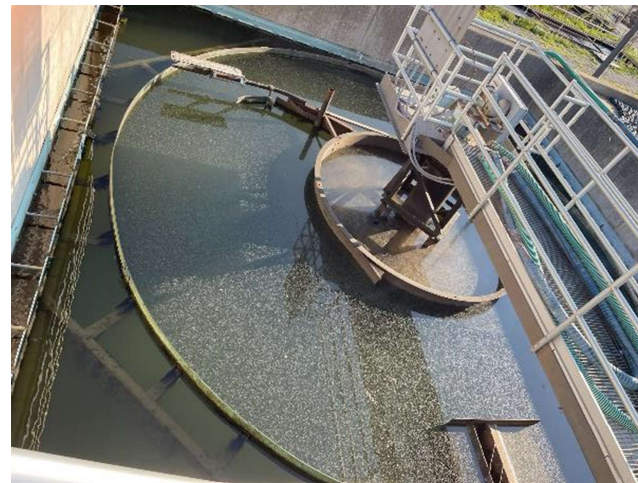


Be careful not to trigger RCRA permitting for any onsite treatment of hazardous waste!!!



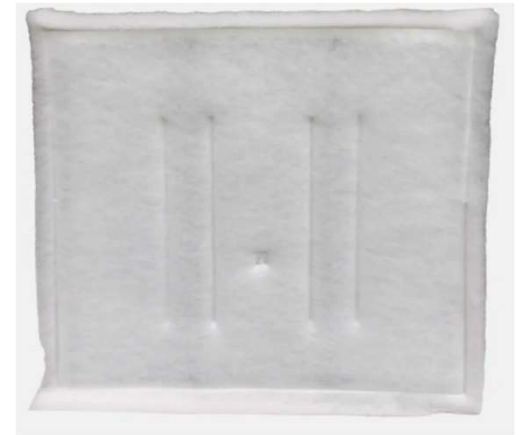
Disposal – Typical Approaches

- ▶ Landfill
- ▶ Surface Impoundments (ponds, pits, lagoons, etc.)
- ▶ Land application
- ▶ Underground Injection
- ▶ Surface water discharge
- ▶ POTW or sewer discharge
- ▶ Stack release / air emissions



Disposal – Away from landfill toward incineration

- ▶ Wet sludge in landfills versus dry filters to incineration



Examples of Waste Exclusions

Requirements Vary by State



Chemical Manufacturer– HSM used as an effective substitute for commercial products



Petroleum Company – Oil Bearing HSM generated at a refinery



Paint Manufacturing Co - HSM Reclaimed and Returned to the Original Production for Reuse



Packaging Manufacturer - HSM Reclaimed and Returned to the Original Production for Process for Reuse



Beverage Manufacturer– HSM used as an effective substitute for commercial products



LIST OF EXEMPTIONS FROM EPA

https://www.epa.gov/sites/default/files/2016-03/documents/broadr_scope_mor_stingnt_122314_apendx_a.pdf

Examples of Waste Exclusions

- ▶ Universal Waste – lamps, batteries, aerosol cans
- ▶ Excluded Solvent Contaminated Wipes
- ▶ Empty Containers



Impact on other regulations

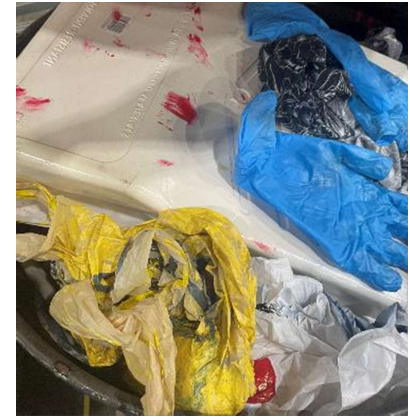
- ▶ Non-hazardous secondary material burned as a fuel: the designation as non-hazardous secondary material or solid waste determines which set of air pollution rules apply – for examples boilers versus incinerators.

Use the Waste Management Plan to Identify Opportunities

Waste ID	Lbs. per year HW	Lbs. max month HW	Options	New lbs. per year HW	New max month lbs. HW
Paint purge solvent	12000	1400	HSM, Ohio Universal Waste	0	0
Aerosol cans	1200	400	Puncture, Universal Waste	5	400 one drum every few years
Cold cleaner solvent	400	400	Reformulate, dirty/clean, filter	0-200	0-400
Pre wetted alcohol wipes	1500	250	Excluded solvent contaminated wipes	0	0
Containers with residue	2400	600	Liners, puncture, drain - empty container exclusion	50	400
Obsolete/expired material	1000	1000	FIFO, schedule, give away	400	400
Process waste	8000	800	P2 Process improvement	4800	400

Waste Volume Creep

- Good intentioned workers
- Areas constrained for space
- Easier than walking to the right container
- Too many choices



Is it always better to reclassify hazardous waste?

Evaluate the Trade-Offs

- Space – how many collection containers
- Confusion – will workers put the waste in the correct container
- Hold time – HW rule full drum starts the clock, Universal wastes and Excluded wipes first day waste is generated starts the clock
- May affect other processes – e.g., VOC exempt solvents in paint not accepted by the recycler
- Let your guard down – perception that the other categories are unregulated or not subject to EPA inspections/fines
- Complexity of managing episodic waste – bump up to LQG
- The value to reclassify is greater when you move across the category thresholds

Keeping coming back with more ideas

- Don't be afraid of far-fetched ideas, list them
- Audit and manage the waste generating processes – stuff changes
- Don't be afraid to approach the EPA – use trade organizations or consultants if you need to remain anonymous.
- Negotiate your permits – EPA is not an expert on your process
- Try to change the laws if you don't like them



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Appendix

Sustainable Waste Management Hierarchy

U.S. EPA developed a waste management hierarchy to establish a priority in approaches to managing waste materials. The hierarchy ranks the various management strategies from most to least environmentally preferred.

The hierarchy places emphasis on **reducing, reusing and recycling** as **key to sustainable materials management**. These strategies also reduce greenhouse gas emissions that contribute to climate change.

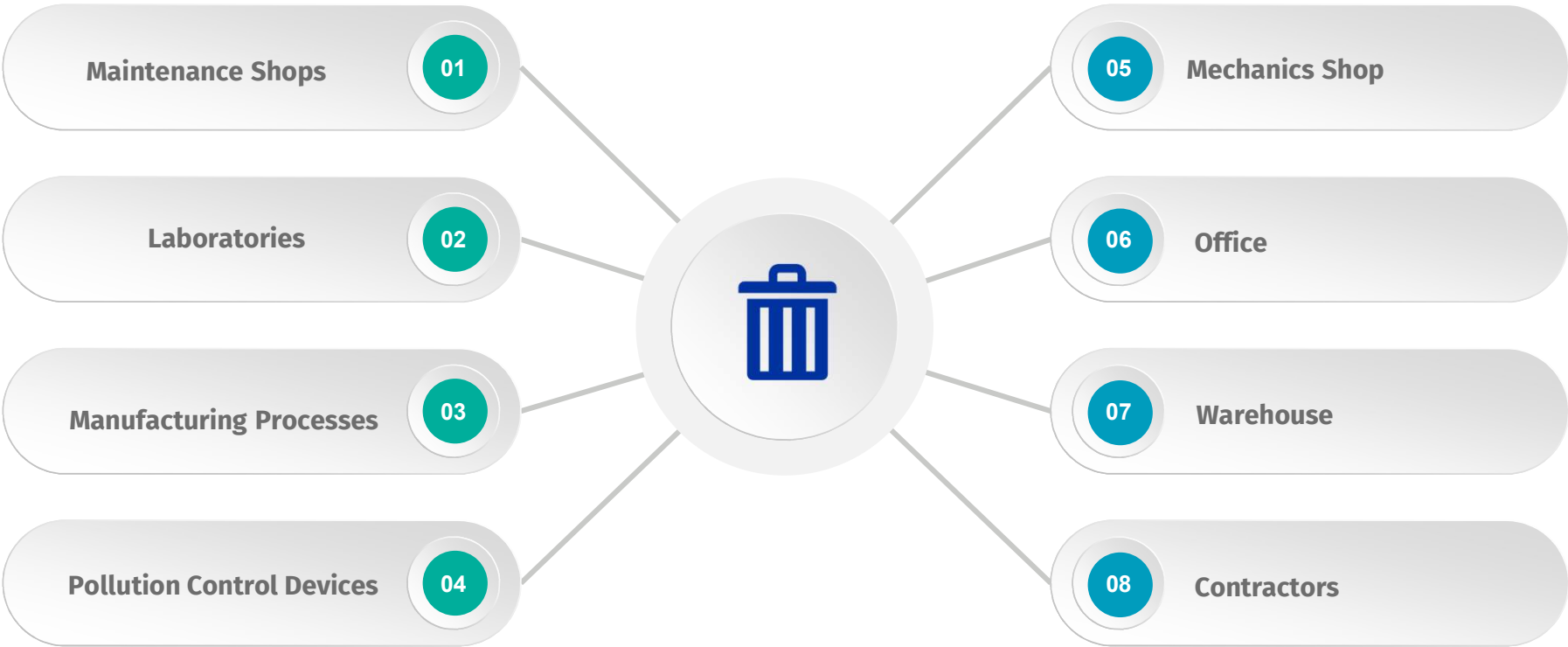


What is a Sustainable Waste Management Plan?

- ▶ Summarizes applicable regulatory requirements
- ▶ Identifies the procedures for the proper management and disposal of a facility's wastes
- ▶ Includes sustainability objectives and practices



Where to find solid waste?



Example of Waste Stream Inventory in a WMP

Waste Description	Approximate Quantity	Solid waste (40 CFR 261.2)?	Excluded Waste (40 CFR 261.4)?	Listed Waste (Subpart D)?	Characteristic Waste (Subpart C)?	Other exclusions or restriction?	Comments
Wastewater Effluent	4,000,000 gals/year	Yes	No	No	No	No	Treated effluent is non-hazardous
Filter Press Solids	4,000 lbs/year	Yes	No	No	Yes	No	EPA No. D006, D007
Waste Paint	7,500 lbs/year	Yes	No	No	Yes	No	EPA No. D007
Waste Solvent	30,000 lbs/year	Yes	No	No	Yes	No	EPA No. D001
Spray Booth Filters	4,000 lbs/year	Yes	No	No	No	No	Non-hazardous waste per lab data
Used Oil	3,000 gals/year	Yes	No	No	No	Yes	Recycled used oil per 40 CFR 279
Empty Aerosol Cans	1,000 lbs/year	Yes	Yes	No	No	Yes	Managed as excluded scrap metal
Scrap Metal	5,000 lbs/year	Yes	Yes	N/A	N/A	N/A	Managed as excluded scrap metal

Co-Generators – Define in your WMP!

(40 CFR 260.10)

Co-Generators
multiple parties
generating waste at
one location



EPA prefers one party accept responsibility



EPA can enforce against any and all parties who fit the definition of a generator



If the contractor handles the waste disposal, the company can still be considered a generator and be liable for the waste



EPA will always look to the site EPA ID number first

Discarded Materials – Categories Not Subject to RCRA Hazardous Waste Regulation

There are four (4) main categories of discarded material which can be excluded or otherwise not subject to RCRA hazardous waste regulations:

- ▶ **Category #1** - Discarded Materials Specifically Excluded from the Definition of Solid Waste (including Hazardous Secondary Materials) – 40 CFR 261.4(a)
- ▶ **Category #2** – Solid Wastes that are Excluded from the Definition of Hazardous Waste – 40 CFR 261.4(b)
- ▶ **Category #3** – Discarded Materials that are Solid Wastes, but not Hazardous Wastes – 40 CFR 262.11
- ▶ **Category #4** – Hazardous Wastes Exempt When Recycled or Managed Under Alternative Methods – 40 CFR 261.6, 266, 273, 279, etc.

Explicit Lists!

Hazardous Waste Treatment in Containers and Tanks

- ▶ Treatment of hazardous waste by generators is allowed without a permit in some jurisdictions under certain circumstances.
- ▶ Examples of treatment include:
 - Hazardous waste compaction
 - Neutralization of corrosive waste
 - Evaporation of hazardous waste
 - Use of absorbents for solidification



Waste Treatment – Typical Approaches

- ▶ Distillation
- ▶ Adsorption
- ▶ Stripping
- ▶ Chemical stabilization
- ▶ Biological processes
- ▶ Evaporation
- ▶ Neutralization
- ▶ Phase separation (filtration, settling, centrifuges, etc.)
- ▶ Thermal or catalytic incineration (for air emissions)

Be careful not to trigger RCRA permitting for any onsite treatment of hazardous waste!!!



Biographical Information

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Tim McDaniel is the Environmental, Health and Safety Manager at Navistar's Springfield Assembly Plant. In this capacity he manages all environmental and sustainability issues. He has been with Navistar at the Springfield operations since 1989 and has worked in the EHS field for 38 years. Tim has worked to advocate smart changes in environmental regulations that provide manufacturing flexibility without compromising sound environmental principles.

Tim serves on the Clark County Solid Waste Management District Policy Committee and Local Emergency Planning Committee. He is the past chairman of the Truck Manufacturers' Association Environmental Management Committee and the Ohio Manufacturers' Association Environmental Committee and was a board member of the Great Lakes Regional Pollution Prevention Roundtable.

Tim received his master's degrees in environmental science and in biology from Indiana University and a bachelor's degree in environmental resources from Eastern Kentucky University.

Tim's favorite hobby is running and has run many marathons.

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Regina DiLamore serves as a Managing Consultant in Trinity's Indianapolis location and serves as Trinity's internal RCRA leader, facilitating RCRA project work nationwide. She is a co-instructor of Trinity's National Introduction to RCRA course and author and instructor for Trinity's Waste Auditing for Industrial Facilities course and the Sustainable Waste Management Program Workshop. DiLamore has significant experience with hazardous waste compliance support, hazardous waste training, and hazardous waste auditing in multiple industries across more than 45 states and internationally. Ms. DiLamore's work also includes the development of audit protocols, environments standards, environmental compliance plans, and support to facilities responding to EPA and state inspections, non-compliance allegations, violation notices, and data requests.