



# Materials Accounting

## Presented By

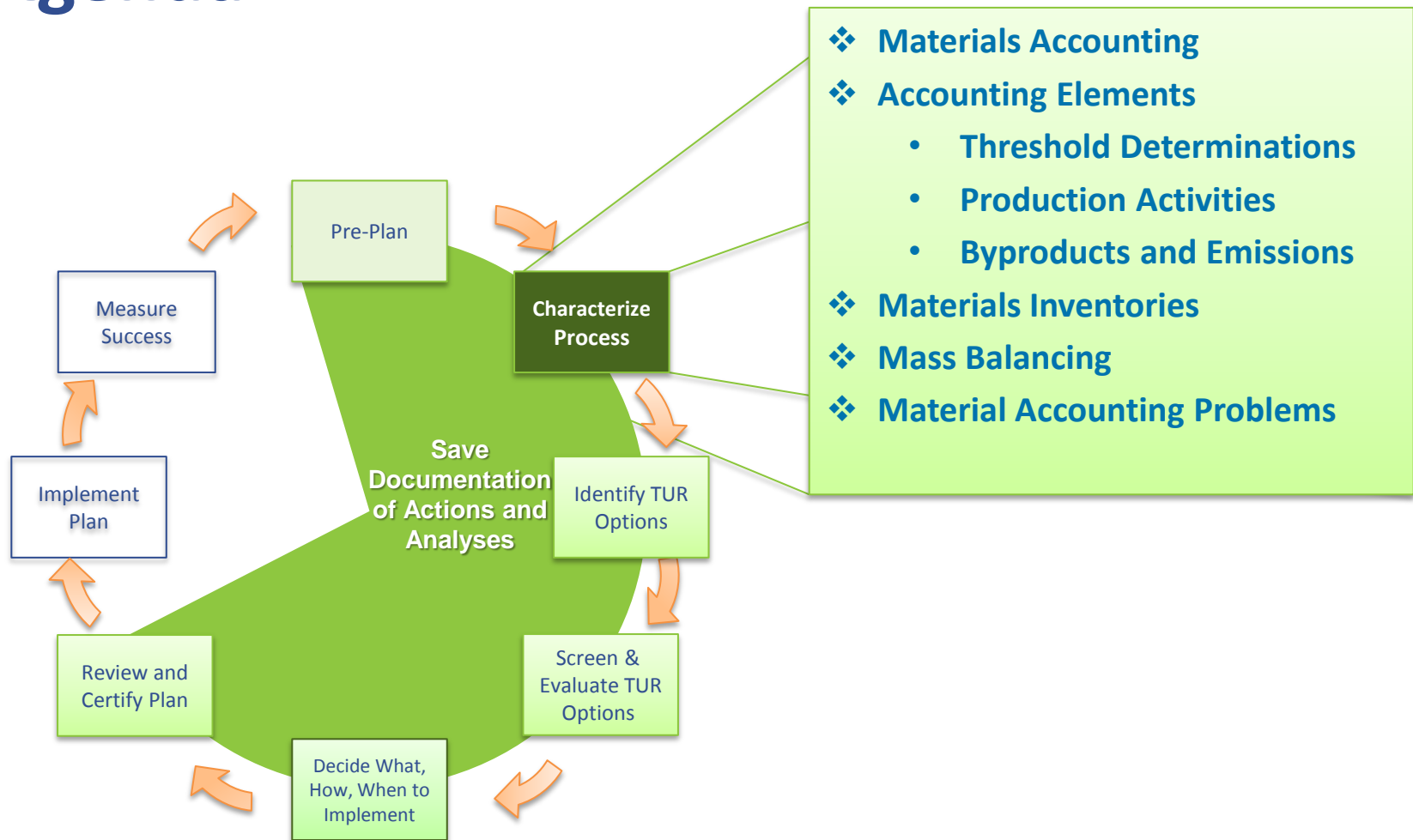
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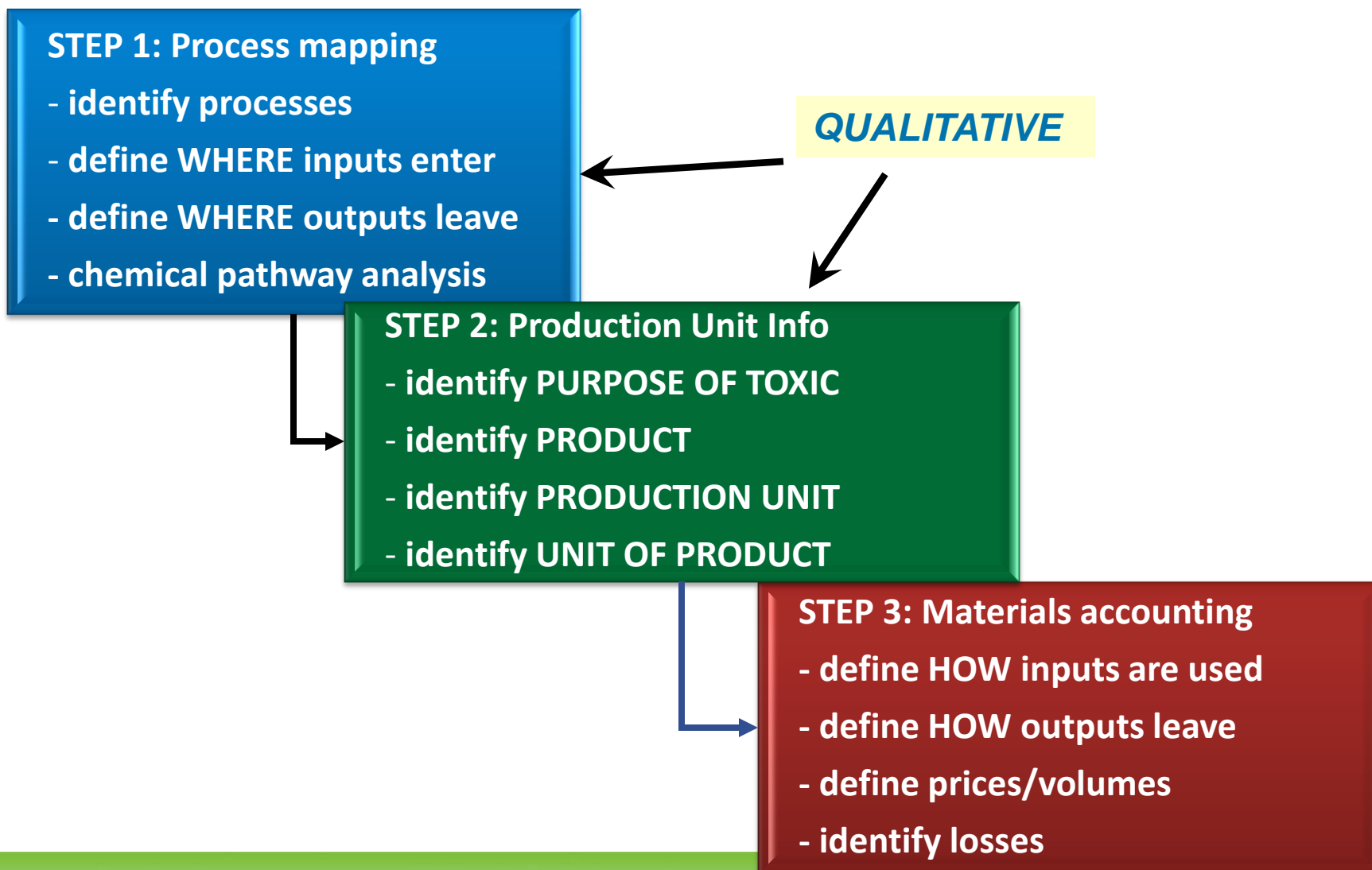
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# Agenda



# What's Involved?



# Definitions

- **Materials Accounting - A procedure for identifying and quantifying the materials and toxic substances used at a facility.**
- **Process Characterization >>> Process Flow Diagrams**
- **Chemical Pathway Analysis >>> Chemical Inputs/Outputs**
- **Materials Accounting >>> Quantification of Inputs/Outputs**
- **SARA Title III, TRI -- On hand data and estimating**
- **TURA -- May require additional analyses and monitoring**
  - **Note: Any "standard engineering practice" can be used provided it is accurate enough to be used for making good business decisions**

# Accounting Elements

## *TURA Plan Material Accounting Requirements*

- **Threshold Determinations**
  - manufactured, processed and otherwise used
- **Production Activities**
  - Measurement of “unit of product”
- **Byproduct and Emissions**
  - Definition of “byproduct” and “emission”

# Threshold Determinations

## *TURA Threshold Determinations*

- **Manufactured and Processed: 25,000 lbs**
- **Otherwise Used: 10,000 lbs**
- **Specific Rules for:**
  - **Mixtures**
  - **Compound Categories**
  - **On-site Reuse/Recycle**
  - **DeMinimis Exemption (1.0% or 0.1%)**

# Threshold Determinations

- **Toxic Chemical Procurement (Purchasing)**
  - Raw Material Purchasing Records
  - Vendor Invoices
  - Transfer Records (between facilities)
    - "Distribution Factor" -- Allocation Formulas
    - "Disbursement" -- Records vs. Actual Use
    - Double Counting
    - Variability
- **Toxic Chemical as Inventory**
  - End-of-Year Inventory Records
  - Storage/Warehouse Record
    - Sources of Material Loss (leaks, evaporation, theft etc.)
- **Toxic Chemical Reuse/Recycling (1%)**

# Production Activities

## Measurement of “Unit of Product”

- Data Sources for Unit of Product
  - Product Shipment Records
  - Product Specifications
  - Invoices to Customers (accounts receivable)
- Correcting Unit of Product
  - Changing Unit of Product
  - Complexity Factors
- Issues
  - "One Time" Product Runs
  - "Work-in-Progress"



# Byproduct

**"non-product outputs of toxic or hazardous substances generated by a production unit, before handling, transfer, treatment or release. Otherwise used substances shall be counted as byproduct when they leave a production unit."**

- byproduct re-introduced into the production unit
- byproduct as product
- byproduct to treatment system

# Emission

"a release of a toxic or hazardous substance to the environment or a transfer of a toxic or hazardous substance in waste to an off-site location"

- Inside facility boundary = Byproduct
- Outside facility boundary = Emission
- Emissions include:

- Air (Point, Fugitive and Area Sources)

- Water (POTW, NPDES, Storm)

- Hazardous and Solid Wastes

- Off-Site Recycling

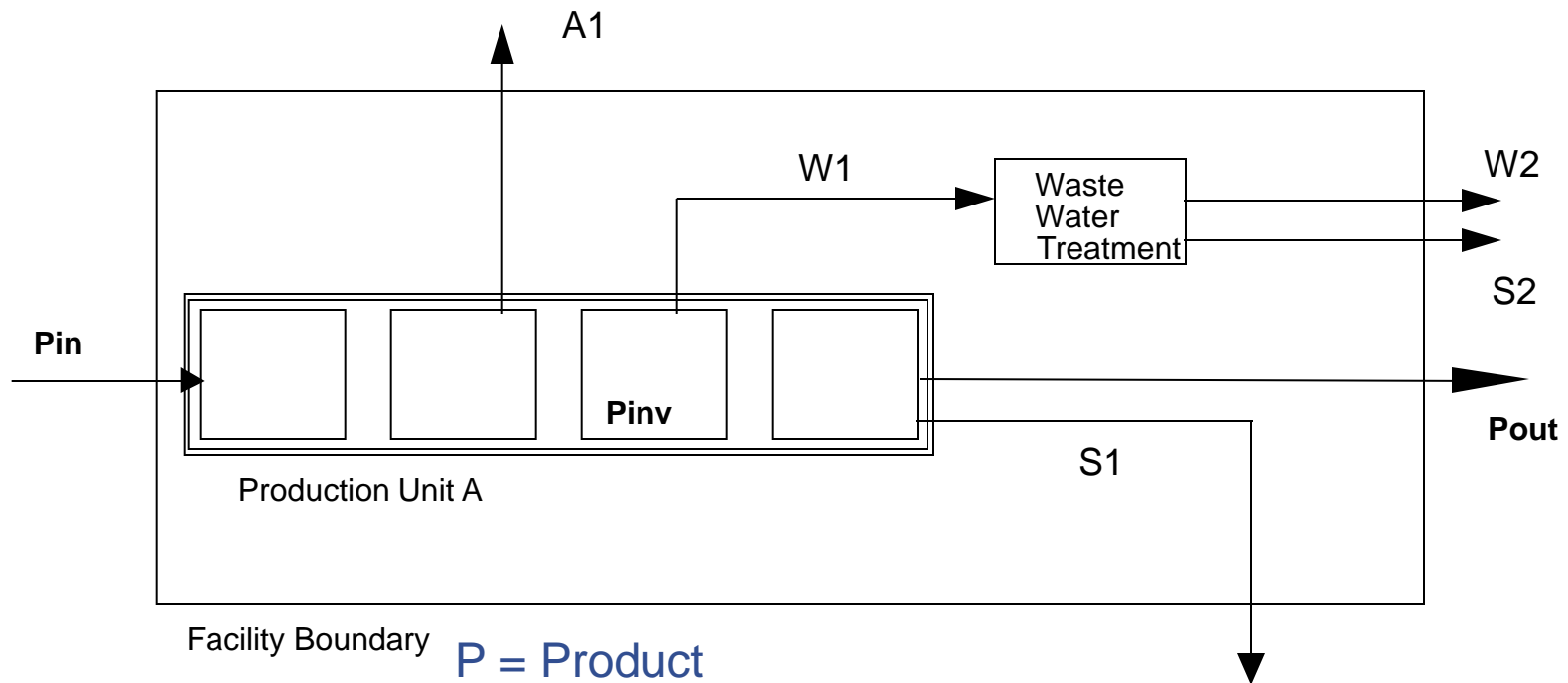
# Byproduct/Emissions

- **Measurement of Byproduct and Emissions**
- **Materials as Byproduct/Emissions**
  - Waste Transport Manifests and Invoices
  - Media-specific Environmental Reports
  - POTW, NPDES, APSR/SSEIS, Biennial Waste Report
  - Toxics Release Inventory Reports
  - Spill/Release Reports
- **Materials Reuse/Recycling**
  - Recycling Records,  
Recycler Invoices  
Recycling Permits  
Scrap Logs

# Byproduct/Emissions

- Measurement Methods
  - Direct Measurements - continuous and non-continuous (extrapolations from periodic monitoring)
  - Engineering and Design Calculations
  - Best Engineering Judgment Estimates

# Byproduct versus Emissions



Facility Boundary

P = Product

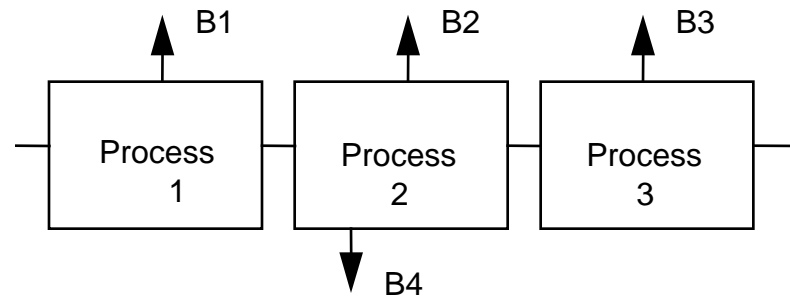
P<sub>inv</sub> = Product Inventory

A = Air S = Solid

W = Water

# Byproduct Generation

- ◆ Total byproduct is often the sum of numerous byproduct generation points:



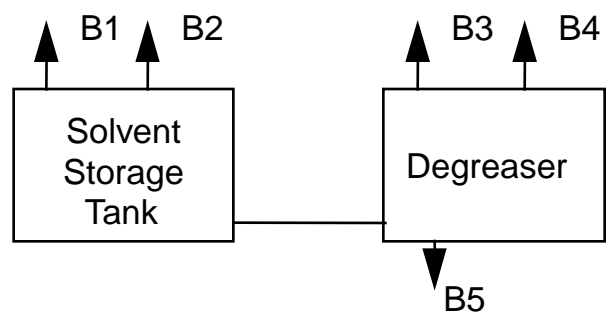
For example, the total byproduct use is:

$$B_{\text{total}} = B_1 + B_2 + B_3 + B_4$$

Each byproduct generation point can be related to the unit-of-product differently.

# Byproduct Generation

- ◆ **Example: A Vapor Degreaser Production Unit may have the following by-product generation points.**



**Where each point is described by the following chart:**

<b>BP</b>	<b>Description</b>	<b>Related to...</b>
B1	Losses during solvent delivery	Number of Deliveries
B2	Volatilization from tank vent	Temperature Differences
B3	Fugitive (Operating Losses)	Hours of Operation
B4	Fugitive (Drag-out)	Number of Parts/Lots
B5	Hazardous Waste Generation	Soil Loading and Humidity

# Information included in Materials Accounting

- ◆ **Manufactured, Processed, or Otherwise Used**
  - **Production Activity**
  - **Generated as a Byproduct**
  - **Released to the Environment or Transferred**
  - **Off-Site (Emissions)**

## **Byproduct & Emissions are further quantified:**

- **treated on-site, treated off-site**
- **recycled on-site, recycled off-site**
- **disposed of on-site, disposed of off-site**
- **released to the environment**



# Mass Balances

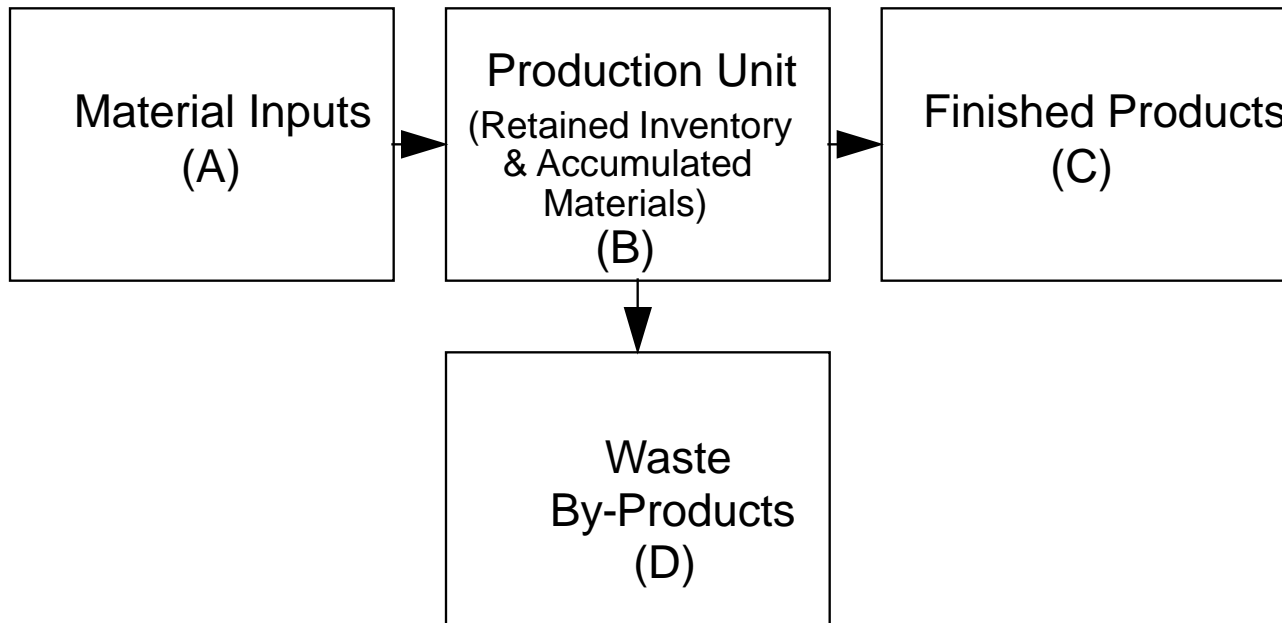
- ◆ An accounting technique that equates the materials put into a process with materials released by the same process.

## Process of conducting a Mass Balance

- "Invisible envelope" around Production Unit
  - Identify and measure all materials that pass into and out of envelope
  - Equate inputs to outputs plus materials accumulated inside envelope
  - Force unknown or difficult to measure items
- ◆ Synthesization and Decomposition

# Mass Balancing

Material In = Material Out + Material maintained in Production Unit



$$A = (C + D) + B$$

# DEP Notes for EACH reportable chemical used:

- Purpose
- TOTAL AMOUNTS & Amounts per unit of product used, generated as byproduct and released
- BYPRODUCT FATE: the amounts released on-site, treated on site and off-site, recycled on-site and off-site, and disposed of on-site and off-site
- EMISSIONS TO EACH MEDIA: the amounts released on-site, disposed on-site, transferred off-site, and treated, recycled and disposed of off-site to air, surface water, ground water, and land

# Missing Elements Noted By DEP

- Chemical use / byproduct / emissions per unit of product missing
- Byproduct fate details missing
- Emissions to media details missing

# Identifying Costs Associated with Toxics

- Not a required element
- Economic analysis is required of technically feasible options later in plan
- It may be more efficient and useful to identify costs associated with the toxic during this step