



Indiana Department of Environmental Management

Protecting Hoosiers and Our Environment Since 1986



Measuring Pollution Prevention Reductions

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Overview

- Why measure?
- Defining a product
- Why normalize?
- Defining the unit of the product / Examples
- Calculating the reductions from the pollution prevention activities



Why Measure?

- Internal corporate goals
- Community relations
- Goals of a voluntary program such as the Environmental Stewardship Program (ESP)



Data portion of the Annual Performance Report

SECTION E ENVIRONMENTAL IMPROVEMENT INITIATIVE RESULTS

Why do we need this information?
Facilities need to share the results of the environmental improvement initiative that was pursued during the reporting period. IDEM needs to report cumulative program reduction results.

What do you need to do?
Reference Section F for "Category" and "Indicator" options to complete this section. Summarize your facility's progress on achieving the initiative you identified in the application or last year's APR. For assistance, please call (800) 988-7901 or email esp@idem.IN.gov.

Initiative #1			
Category 1: <input type="text"/>	Baseline <i>(indicate measurement unit)</i>	Current <i>(indicate measurement unit)</i>	Cost Savings
Indicator 1: <input type="text"/>			
Calendar year	<input type="text"/>	<input type="text"/>	<input type="text"/>
Actual quantity <i>(per year)</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Production unit <i>(select one)</i>	Earned Labor Hours <input type="text"/> Production units <input type="text"/> Production lbs. <input type="text"/> Other -- specify (e.g. Gallons, length, etc.) <input type="text"/>		
Production Quantity	<input type="text"/>	<input type="text"/>	NA
Normalization factor (Current year production ÷ Baseline year production)			
Normalized quantity (Actual Current year quantity ÷ Normalizing factor)			
Briefly describe <i>how</i> you achieved improvements for this environmental initiative or, if relevant, any circumstances that delayed progress.			
<input type="text"/>			

Defining a product

- A product is the outcome of a production process.
 - Physical product such as a car, metal part, food product
 - Service such as dry cleaning clothes or painting cars
- Types of products
 - Intermediate
 - Final
- Family of products
 - Products can be defined in terms of families where each use the same toxic chemicals, produce the same toxic chemicals in the waste stream, or are interchangeable; or, where the facility considers all the results the same product.



Why Normalize?

When measuring a pollution prevention reduction, the selected measure must be normalized against the level of production in order to guarantee that the decrease is due to pollution prevention changes and not simply reductions due to decreases in the level of production. Therefore, the output of a production unit needs to be represented by some metric that accurately reflects the level of production.

Defining the unit of a product

- A unit of product is some measure of product output that is directly related to the level of production.
- Careful attention should be given to defining an appropriate unit of product because future efforts to report success in a pollution prevention project will be affected by the unit of analysis selected. In selecting a unit of product, choose a measure of facility productivity that closely reflects all activities involving the pollutant or material input being reduced.

Defining the unit of a product (cont.)

- A unit of product should be some kind of physical measure. A nonphysical measure can be used as a unit of product, but care must be taken in normalizing all measures. For example, dollar sales as a unit of product should be corrected for the influence of inflation.
- Good examples of units of product are:
 - Gallons of paint manufactured
 - Square centimeters of jewelry plated
 - Pounds of nails manufactured

Examples of unit of product

- Defining an appropriate unit of product is not always obvious.
- For instance, a plastic bag manufacturer may want to define the “number of plastic bags” as the unit of product. But if this manufacturer produces a variety of plastic bags ranging from thin ones made up of one layer of plastic film to others made up of many layers of plastic film, the company may wish to define “pounds of plastic film” as the appropriate unit of product.

Problematic units of product

- We often see these units and they can be problematic when normalizing data
 - Costs
 - Sales
- These type of units of product often are variable from year to year and can cause data to be skewed.



Verifying the unit selected

To verify that an appropriate unit of product has been selected, check the data to see if the magnitude of pollutant or material use per unit of product relatively constant for all products and production levels within the production unit. If it is consistent, then the unit of product will serve as a reliable standard for measuring progress. It will provide a measure that is unaffected by shifts in the rates at which various products are made.

Calculating pollution prevention unadjusted metrics

Calculate the unadjusted pollution prevention metric for the production unit by using the following calculation:

Waste reduced/increased: $\text{Waste}_{\text{time2}} - \text{Waste}_{\text{time1}}$ or

Material use decreased/increased: $\text{Use}_{\text{time2}} - \text{Use}_{\text{time1}}$

Where time1 is the previous time period (year) and time2 is the current time period (year).

Calculating pollution prevention reductions using Normalizing factor

- Calculate the Normalizing factor or Activity Index by using the following formula:

$$I = Q_1 / Q_0$$

Where Q_1 is the production level or activity level in the current year and Q_0 is the production or activity level in the previous year.

- The measurement of P2 is then calculated as
Normalized P2 = $(\text{Waste}_{\text{time2}} - \text{Waste}_{\text{time1}}) * I$



Additional Resources

[“Issues in Facility-Level Pollution Prevention Measurement”](#) 2016

Melissa Malkin and Jesse N, Bakir Research Triangle Institute, Center for Environmental Analysis, P.O. Box 12194 Research Triangle Park, NC 27709
Jordan Spooner U.S. Environmental Protection Agency, Pollution Prevention Division, 401 N Street S.W., Washington, DC 20460

[“Toxics Use Reduction to Achieve Enhanced Pollution Prevention Success”](#) 2016

Mark Myles, Massachusetts Toxics Use Reduction Institute, University of Massachusetts Lowell, 600 Suffolk St, Lowell, MA 01854, www.turi.org



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