

Material Health & Safety Metric Background

- Beta test version of scorecard uses a placeholder ‘Evaluation of Material Type’ metric based on OSHA injury rates for manufacture of each material
- In March 2007, packaging steering committee agreed that a more robust **‘Health & Safety’** metric should be developed

Rationale for Developing a Health & Safety Metric for Packaging

- The production and use of packaging can impact the environment in numerous ways:
 - Chemicals produced and released
 - Supply-chain transportation emissions
- It is therefore necessary to develop methods to assess the impact of packaging to:
 - Human health and the environment
 - Worker health and safety

Background

- A sub-group of the steering committee was formed to **develop recommendations** for a robust packaging Health & Safety metric
- The current subgroup includes government and NGO representation, and does not include representation from industry

Health & Safety Metric Subgroup

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Sara Hartwell, EPA

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With participation from Amy Zettlemyer

Recommendations

Health and Safety metric should be life cycle based and should include:

1. A measure of **toxicological impact** of package manufacture to communities and ecosystems (50%)*
2. A measure of **OSHA injury** rates associated with package manufacture (50%)*

*Weighting is pending further discussion

Rationale for using OSHA injury rates

- The OSHA injury data (in theory) includes both injury due to the danger of the job and chemical exposure-related injuries.
- From a safety standpoint, it is important to capture both types of injury data.

Packaging Health & Safety

Metric: Life Cycle Approach



Necessary data:

1. Lifecycle toxic emissions

2. Lifecycle OSHA injury rates

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Material Health and Safety Metric

Toxicological Impact Measure

- Will be based on life cycle emissions data collected through LCI data request
- Measure of toxicity of each emitted chemical will be calculated. We are currently considering the **EPA PBT Profiler** as a screening method.

EPA PBT Profiler

<http://www.pbtprofiler.net>

- Calculates **Persistence**, **Bioaccumulation** factor, and **Toxicity** of a substance based on CAS number
- Developed jointly by EPA, American Chemistry Council, Chlorine Chemistry Council, Synthetic Organic Chemical Manufacturers Association, with contributions from Environmental Defense
- Designed as a tool to evaluate toxicity of substances lacking physical and toxicological data, but linked to a database of existing data for ~4000 substances. If used for Wal-Mart scorecard, data will be updated.
- Does not include metals

Rationale for using PBT Profiler

- Chemicals that are persistent, bioaccumulative and toxic are generally chemicals of concern because once they are in the environment, they are difficult to remove.
- The PBT Profiler, as it exists today, is better at capturing the PB characteristics, but the tool is evolving and we expect it to get better at characterizing the T characteristics.
- The PBT Profiler was constructed with input from multiple stakeholders
- The EPA continues to improve and expand the capacity of the PBT profiler.
- Although metals are not included in the Profiler, the small number of metals that need to be considered can be added.

Proposed Calculation Method

$$\text{Toxicity Indicator} = \mathbf{E} \times \mathbf{L/T} \times \mathbf{BCF}$$

Where:

E = Life cycle emissions, grams (from submitted LCA data)

L = Media weighted lifetime (from PBT output)

T = Fish chronic toxicity, mg/L (from PBT output)

BCF = Bioaccumulation factor (from PBT output)

* For metals: L, T, and BCF would need to be determined and input separately

Proposed Calculation Method

Three Example Substances:

	E	L	T	BCF	TI
	Emissions (mg/year)	Weighted lifetime (years)	Fish chronic toxicity (mg/L)	Bioconcentration Factor	Toxicity Indicator (L)
Acetone	1000	0.091	480	3.2	6.07E-01
Bifenthrin	1000	0.767	0.00015	38.0	1.94E+08
Chloroform	1000	0.296	30	3.0	2.96E+01

$$\text{Toxicity Indicator} = E \times L/T \times BCF$$

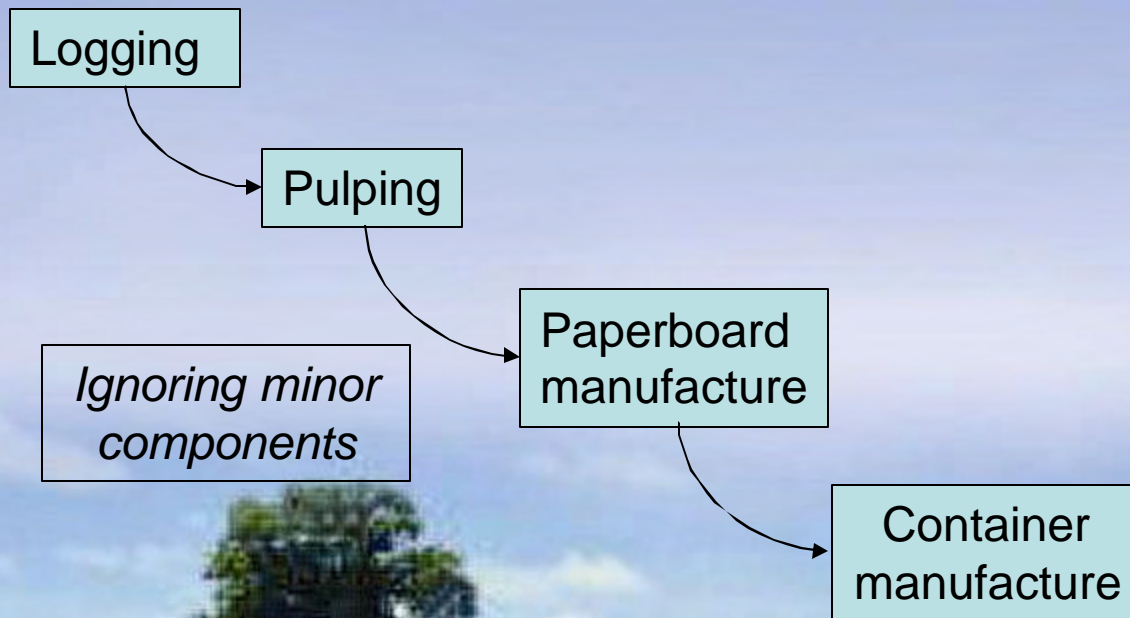
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Material Health and Safety Metric

OSHA Injury Rate Measure

- Will be based on life cycle OSHA injury rate data collected through LCI data request

Example: Paperboard Container



At Each Life Cycle Stage, Wal-Mart will need data on:

- Most recent annual accident & injury numbers
- Annual production in sector by mass
- Proportion of that production that feeds to the next life cycle stage

Proposed Calculation Method

Example: Paperboard container

Life Cycle Unit Process	2005 OSHA Recordable per 100 man-years	2005 employment, thousands	2003 Production 10 ⁶ tons	OSHA Recordables per 10,000 ton	OSHA Recordables per 10,000 tons, adjusted for 20% loss per stage
Forestry and logging (Industry Code: 113000)	5.9	62.5	375,000	9.83E-05	1.70E-04
Pulp mills (Industry Code: 322110)	2.6	99.2	57.7	0.45	0.64
Paperboard mills (Industry Code: 322130)	2.3	36.9	49.7	0.17	0.20
Paperboard container manufacturing (Industry Code: 322210)	4.5	180	50.3	1.61	1.61
Total				2.22	2.46

Next Steps

1. Data Collection:

- Life cycle data for **material manufacture** (cradle to base material; collection to recycled material) must be submitted as soon as possible
- **OSHA injury rates** will be compiled from publicly available data sources

Next Steps

2. Continued development of metric:

- Moving forward, subgroup will:
 - Evaluate and confirm the proposed calculation and measurement methods for OSHA injury & Toxicity
 - Work to gather data (especially for metals) and test/improve models
 - Evaluate functionality of the metric as LCA data becomes available

Next Steps

2. Continued development of metric:

- Subgroup will continue to meet for 1 hour bi-weekly sessions
- To join subgroup, send a written request to:
pkgsvn@wal-mart.com
- Preference will be given to representatives with toxicological experience or materials health/safety background

Concerns

- The analysis will only be as good as the data
 - Life Cycle Inventory data inputs
 - Toxicological data – capture human health concerns?
 - OSHA data – capture both injury and illness?
- The proof is in the pudding
 - Must test the metric with real LCI data
- The metric may need to be adjusted, depending on results, to make sure that the analysis passes the “reasonableness” test