Practical Approaches that Work

Waste Assessments

Tracking and Measurement

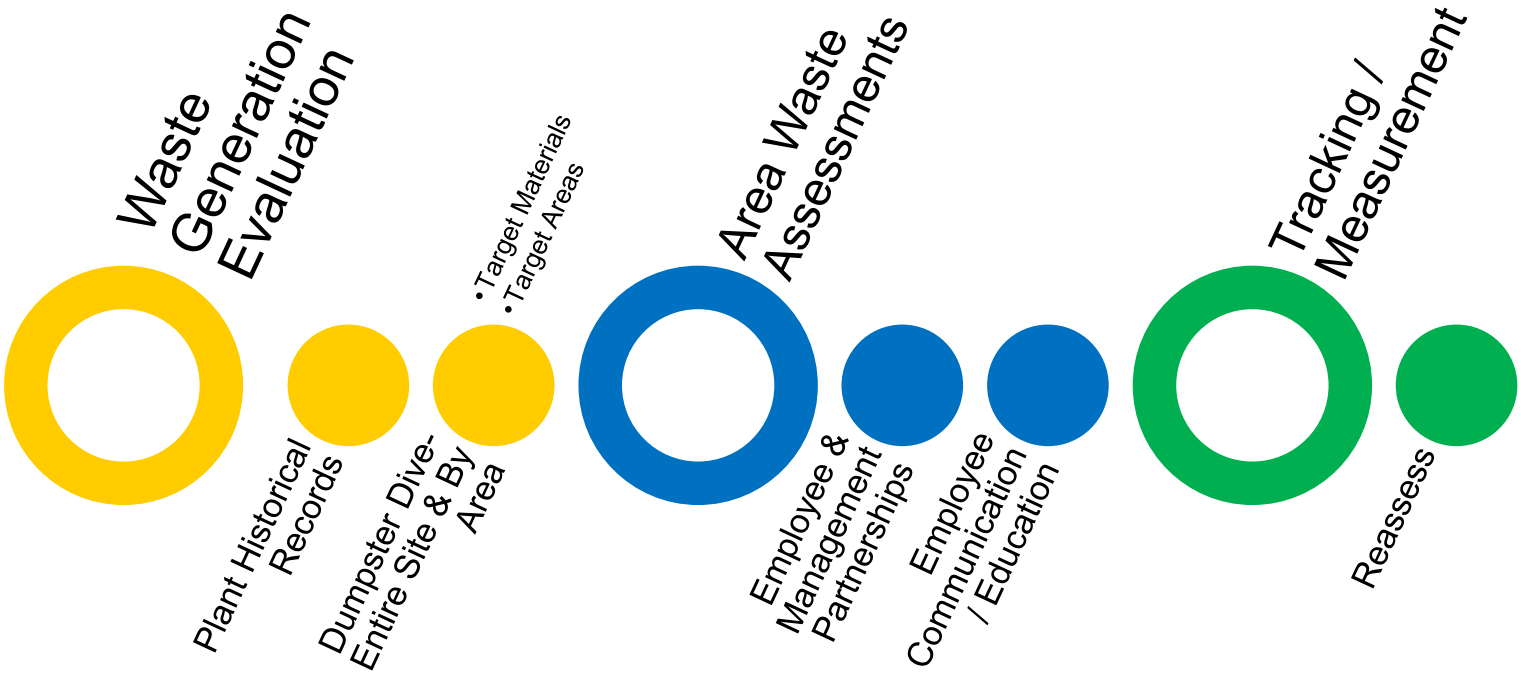
Diana P. Joyner, Environmental Engineer

March 22nd, 2016

Westinghouse


START

Approach



Westinghouse, Columbia Fuel Fabrication

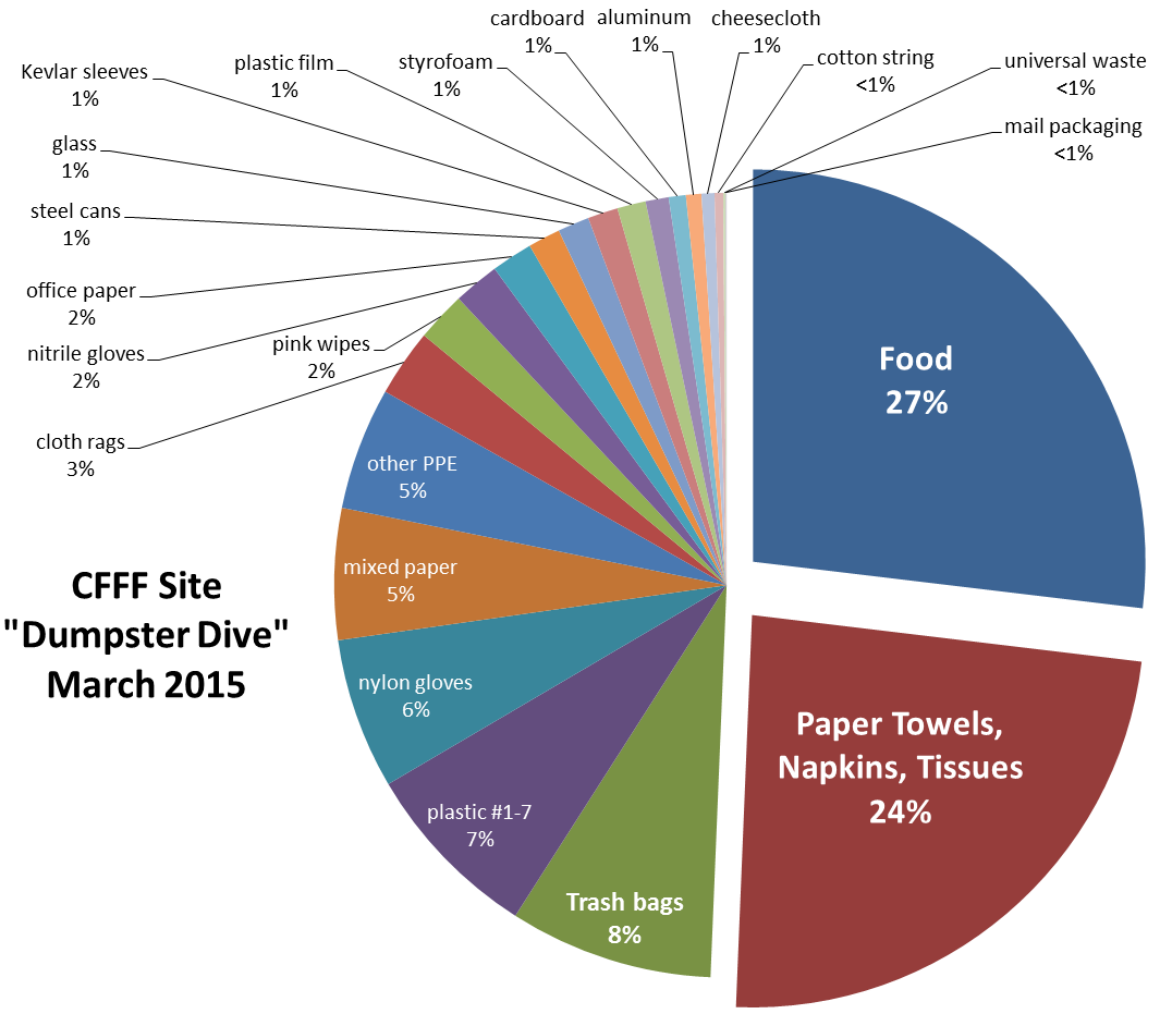
Solid Waste Generation Rates (FY)

- 2008 • 50 tons / month
- 2013 • 25 tons / month
- 2014 • 17 tons / month
- 2015 • 13.3 tons/ month

Ultimate Goal = 0

Westinghouse

What Does Your Company Throw Away?
CFFF Site Dumpster Dive March 2015



Where should the Site's Focus Be?

- **Food Waste**
- **Paper Towels**
- **Trash Bags**

Waste Reduction Opportunities
Food Scrap Collection

Food Scraps

+

OR

=

0 Food Waste
to Landfill

&

27% reduction
in Westinghouse Non-Manufacturing Waste

Westinghouse

Waste Assessments

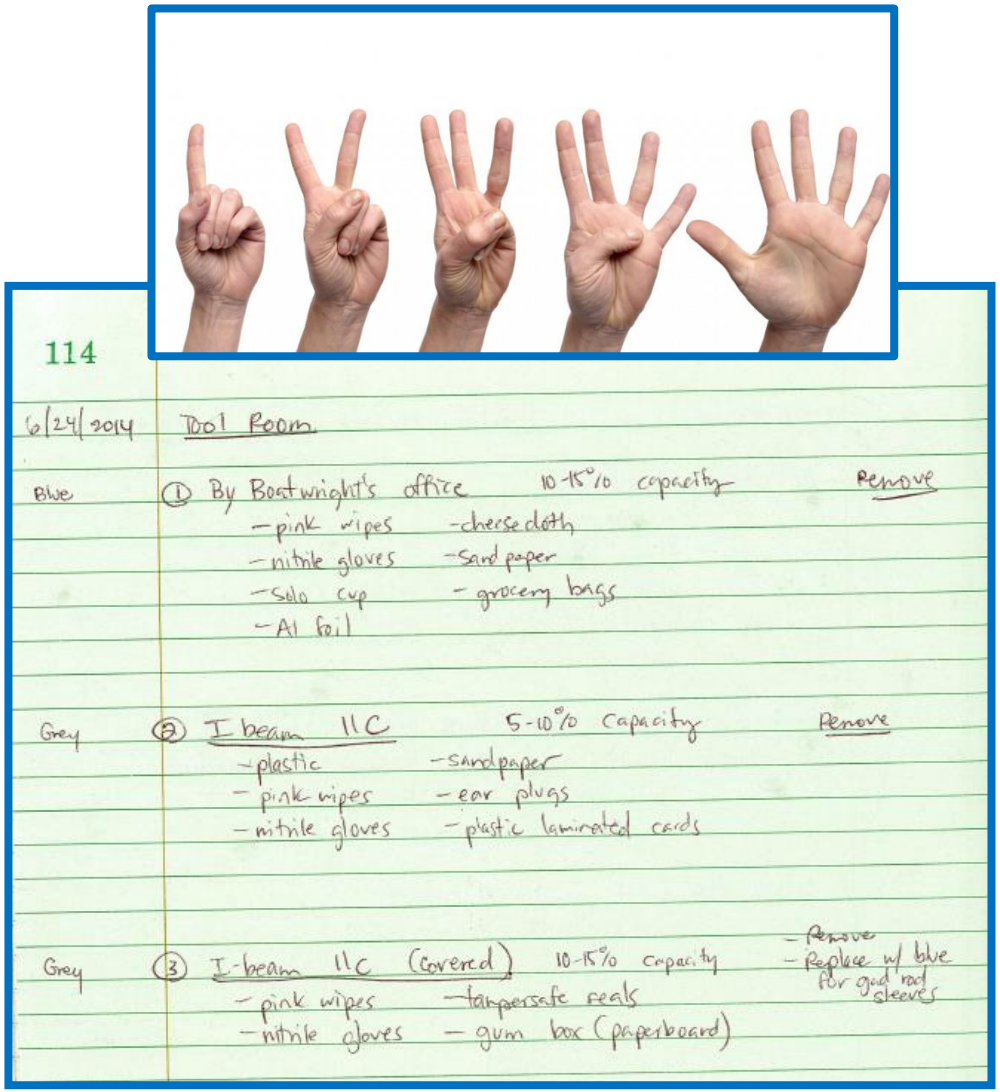
Waste Assessment
Benefits

- In-depth understanding of waste generation for **source targeting**
- **Area Focus** (aka “Buy In”) to the site’s larger goal of ZWTL
- **Feedback** for site sustainability team on what is and is not working

Westinghouse

Waste Assessment Basics

- **Count** Receptacles
- Describe the **Location**
  - When possible, take pictures
- **Assess** Receptacles for:
  - Proximity to generation
  - Size / Capacity
  - Usage
    - at the end of the shift/day
  - Contents
    - Currently Recyclable?
    - Potentially Recyclable?
    - Truly Landfill?



Westinghouse

Waste Assessments

Area: CFFF Tool Room

Waste Assessment
Area Focus: CFFF Tool Room

Waste Assessment
Area Focus: CFFF Tool Room

- **20 Trash Receptacles**
  - 11 rigid receptacles
  - 9 portable carts
    - Both used 56-gal capacity bags

- **Area Assessment**
  - Recyclable items were being thrown away because recycling receptacles were not easily accessible
  - Too many trash receptacles for the work space
  - Emptied too frequently
  - Oversized receptacles

Westinghouse

Waste Assessment
Area Focus: CFFF Tool Room Path Forward

- **Area Buy-In**
  - Area managers and workers agreed they did not need 20 receptacles
- **Receptacle Reduction**
  - Reduced by half, with primary decision to use portable carts
  - Recycling receptacles added where needed
- **Can Liner Reduction** by half
- **Service Frequency**
  - Discussions initiated with janitorial staff not to remove bags less than half full

Westinghouse

Waste Assessments

Receptacle: CFFF Tube Prep

A picture is worth

words

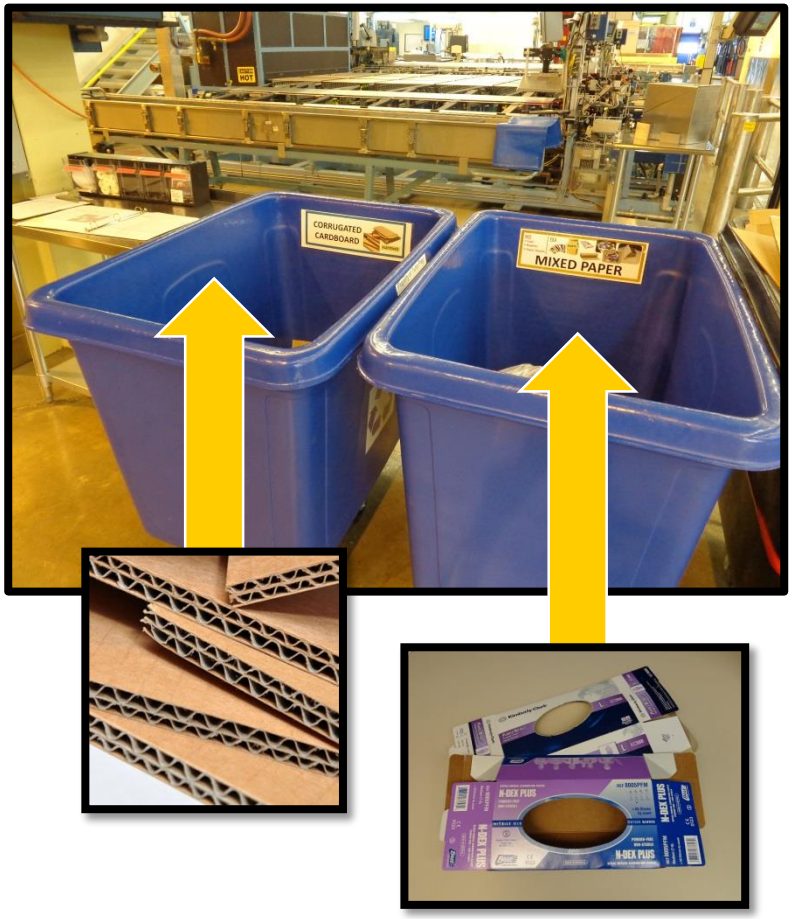
Waste Assessment
Receptacle: CFFF Tube Prep

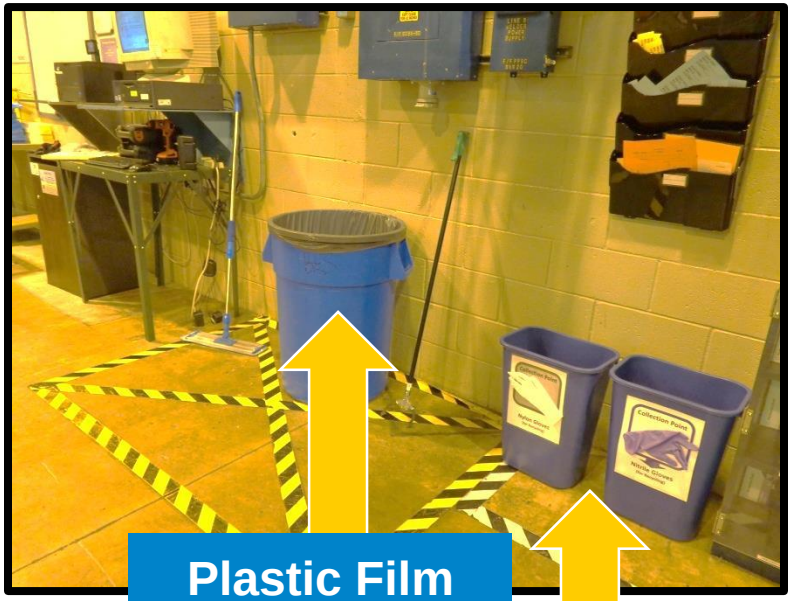
Before

After

What recycling programs were implemented at the time?

Waste Assessment
Employee Education & Communication





Westinghouse

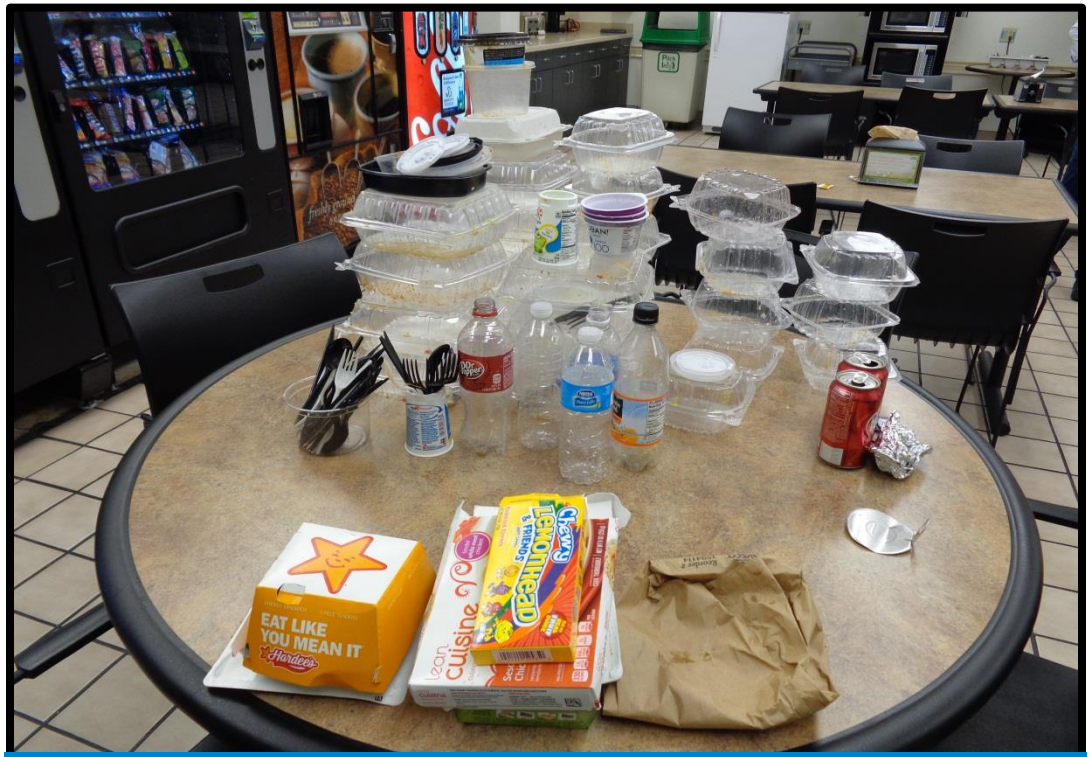
Waste Assessments

Receptacle: CFFF Break Room 301/302

Waste Assessment
Receptacle: Break Room by 301/302

Opportunity:

- Trash cans located near exit
- Simple location of bin did not encourage recycling



Solution:

- Reorganized room to co-locate trash and recycling receptacles
- Improved communication signs

Westinghouse

Waste Assessment
Employee Education & Communication

3-Dimensional Signs Created

Westinghouse

Waste Assessment
Employee Education & Communication

Tracking and Measurement

Tracking and Measurement

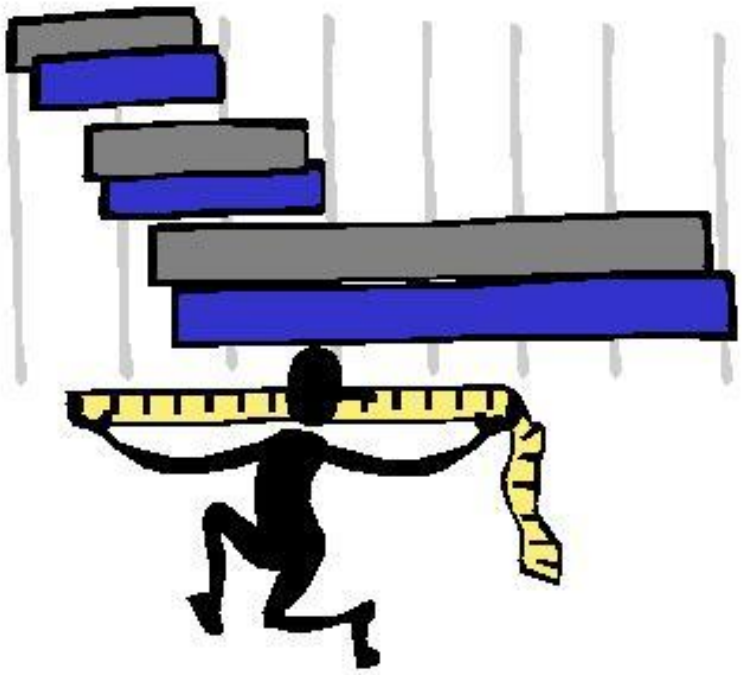
Why measure and track solid waste?

- To set goals and/or meet company requirements
- Understand your waste stream
- Identify Improvement Opportunities
- Cost accounting
- To establish a baseline

Westinghouse

Tracking and Measurement
Establish a Baseline

- Create a **spreadsheet** / use a company template
- **Compile** several years of waste generation data
  - Note any anomalies or changes that could skew the data:
    - Production
    - Headcount
    - Construction activities, etc.
- **Select** representative baseline measurement term, usually a calendar year or fiscal year

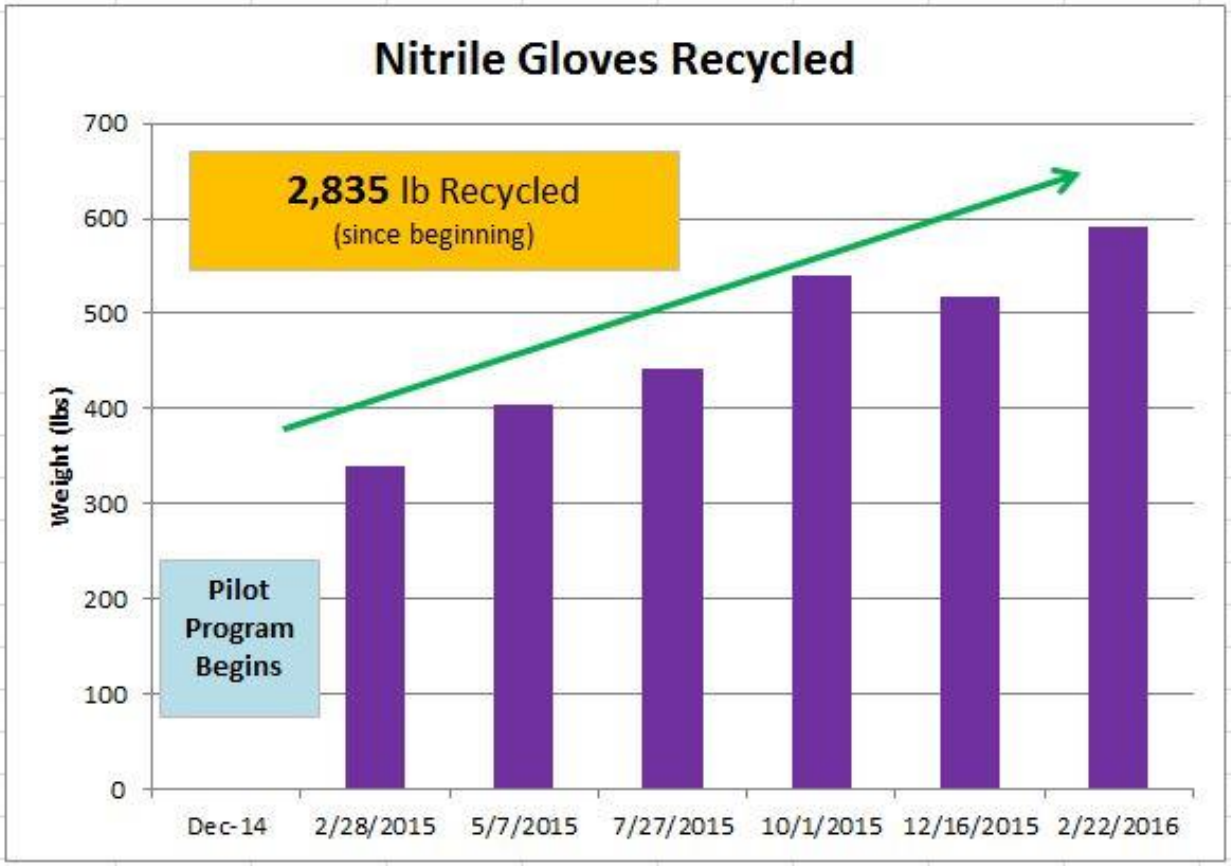


Westinghouse

Tracking and Measurement

Waste Generation Data Collection

Date	Weight (lb)	# Flanders boxes sent
Dec-14		
2/28/2015	339	8
5/7/2015	405	8
7/27/2015	442	8
10/1/2015	540	8
12/16/2015	517	7
2/22/2016	592	7



Tracking and Measurement
Set Goals and Track Them

T32

PLEASE SUBMIT YOUR SUPPORTING DATA FILE; IN THIS FORMAT OR HOWEVER YOU TRACK THE CATEGORIZATION OF SEGREGATED STREAMS

Westinghouse Electric Company LLC
Baseline Environmental Performance Indicators Period: FY15
Waste data collection for Major facilities

Location name: Columbia

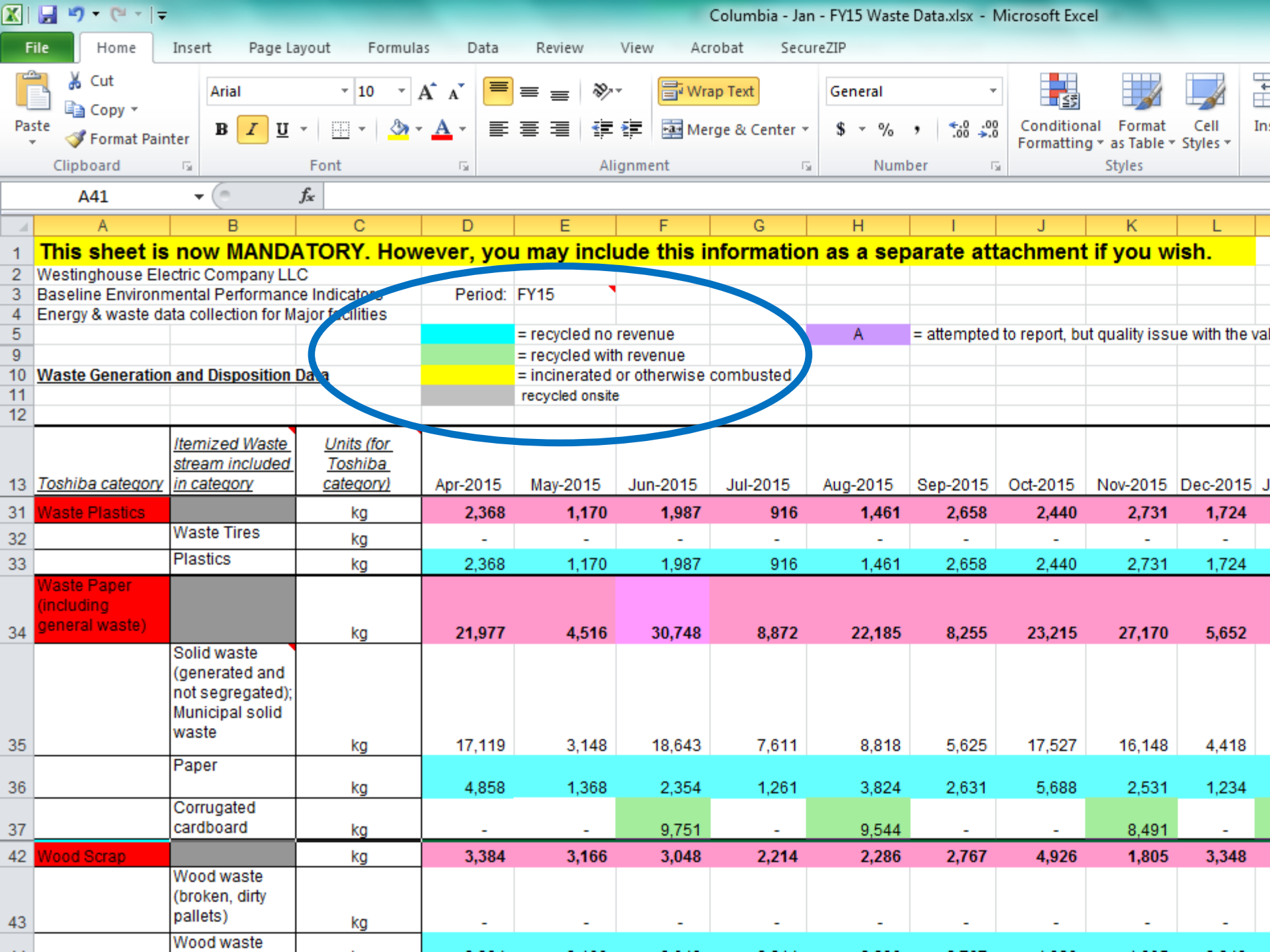
Waste Generation and Disposition Data

Peer Reviewed:

Toshiba category	Itemized Waste stream included in category	Units (for Toshiba category)	Apr-2015	May-2015	Jun-2015	Jul-2015	Aug-2015	Sep-2015	Oct-2015	Nov-2015	Dec-2015	Jan-2016	Feb-2016	Mar-2016	conversion conversion
Waste Plastics															
	Waste Tires	pounds													0.45359
	Plastics	pounds	5220	2580.0	4380	2020	3220	5860	5380	6020	3800	1620			0.45359
Waste Paper (including general waste)															
	Solid waste (generated and not segregated); Municipal solid	tons (short tons)	18.87	3.47	20.55	8.39	9.72	6.2	19.32	17.8	4.87	9.46			907.19
	Paper	pounds	10,710	3015.0	5,190	2,780	8,430	5,800	12540	5580.0	2720	5140			0.45359
	Corrugated cardboard	pounds			21,498		21,040			18720		19480			0.45359
Wood Scrap															
	Wood waste (broken, dirty pallets)	tons (short tons)													907.19
	Wood waste	tons (short tons)	3.73	3.49	3.36	2.44	2.52	3.05	5.43	1.99	3.69	4.49			907.19

logsdocj:
940 lbs mixed paper
4200 lbs shred paper

Instructions | Information | Official Waste Sheet | 2 Combined data by category | 3 Waste categories in kgs | Peer Reviewer Guidance | Change Reco



Columbia - Jan - FY15 Waste Data.xlsx - Microsoft Excel

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Acrobat | SecureZIP

Cut | Copy | Format Painter | Paste | Clipboard

Arial | 10 | Font

Wrap Text | Merge & Center | Alignment

General | Number

Conditional Formatting | Format as Table | Cell Styles | Styles

A41

This sheet is now MANDATORY. However, you may include this information as a separate attachment if you wish.

Westinghouse Electric Company LLC

Baseline Environmental Performance Indicators — Period: FY15

Energy & waste data collection for Major facilities

= recycled no revenue

= recycled with revenue

= incinerated or otherwise combusted

recycled onsite

A = attempted to report, but quality issue with the val

Waste Generation and Disposition Data

Toshiba category	Itemized Waste stream included in category	Units (for Toshiba category)	Apr-2015	May-2015	Jun-2015	Jul-2015	Aug-2015	Sep-2015	Oct-2015	Nov-2015	Dec-2015
Waste Plastics		kg	**2,368**	**1,170**	**1,987**	**916**	**1,461**	**2,658**	**2,440**	**2,731**	**1,724**
	Waste Tires	kg	-	-	-	-	-	-	-	-	-
	Plastics	kg	2,368	1,170	1,987	916	1,461	2,658	2,440	2,731	1,724
Waste Paper (including general waste)		kg	**21,977**	**4,516**	**30,748**	**8,872**	**22,185**	**8,255**	**23,215**	**27,170**	**5,652**
	Solid waste (generated and not segregated); Municipal solid waste	kg	17,119	3,148	18,643	7,611	8,818	5,625	17,527	16,148	4,418
	Paper	kg	4,858	1,368	2,354	1,261	3,824	2,631	5,688	2,531	1,234
	Corrugated cardboard	kg	-	-	9,751	-	9,544	-	-	8,491	-
Wood Scrap		kg	**3,384**	**3,166**	**3,048**	**2,214**	**2,286**	**2,767**	**4,926**	**1,805**	**3,348**
	Wood waste (broken, dirty pallets)	kg	-	-	-	-	-	-	-	-	-
	Wood waste										

Tracking and Measurement
Rates

- **Waste to Landfill (WTL) / Final Disposal Rate (FDR)**

$$\text{Ratio} = \frac{total\ waste\ sent\ to\ landfill}{total\ waste}$$

$$\text{Percent} = \frac{total\ waste\ sent\ to\ landfill}{total\ waste} \text{ x } 100\%$$

- **Diversion Rate**
- percentage of waste materials diverted from traditional disposal such as landfilling or incineration to be recycled, composted, re-used, waste to energy, or otherwise kept from going to a landfill

$$\text{Ratio} = \frac{total\ materials\ recycled, composted, reused, etc}{total\ waste}$$

$$\text{Percent} = \frac{total\ materials\ recycled, composted, reused, etc}{total\ waste} \text{ x } 100\%$$

Westinghouse

ZWTL = 100% Diversion Rate

- **Waste to Landfill (WTL) / Final Disposal Rate (FDR)**

$$\text{Ratio} = \frac{total\ waste\ sent\ to\ landfill}{total\ waste}$$

$$\text{Percent} = \frac{total\ waste\ sent\ to\ landfill}{total\ waste} \text{ x } 100\% = \frac{17{,}119\ kg}{146{,}317\ kg} \text{ x } 100\% = \mathbf{11.7\%}$$

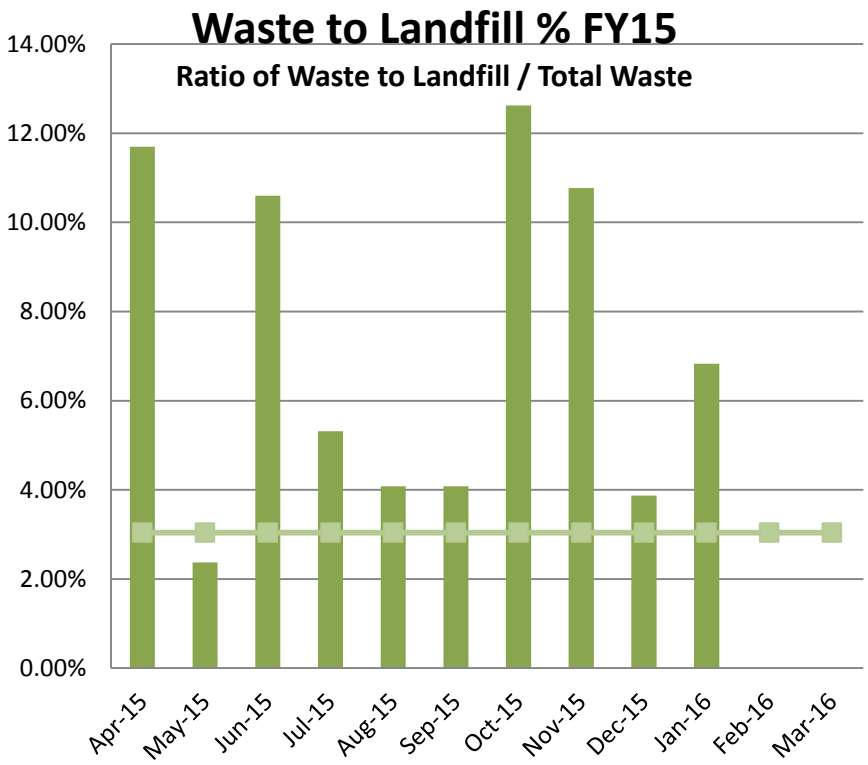
- **Diversion Rate**
- percentage of waste materials diverted from traditional disposal such as landfilling or incineration to be recycled, composted, re-used, waste to energy, or otherwise kept from going to a landfill

$$\text{Ratio} = \frac{total\ materials\ recycled, composted, reused, etc}{total\ waste}$$

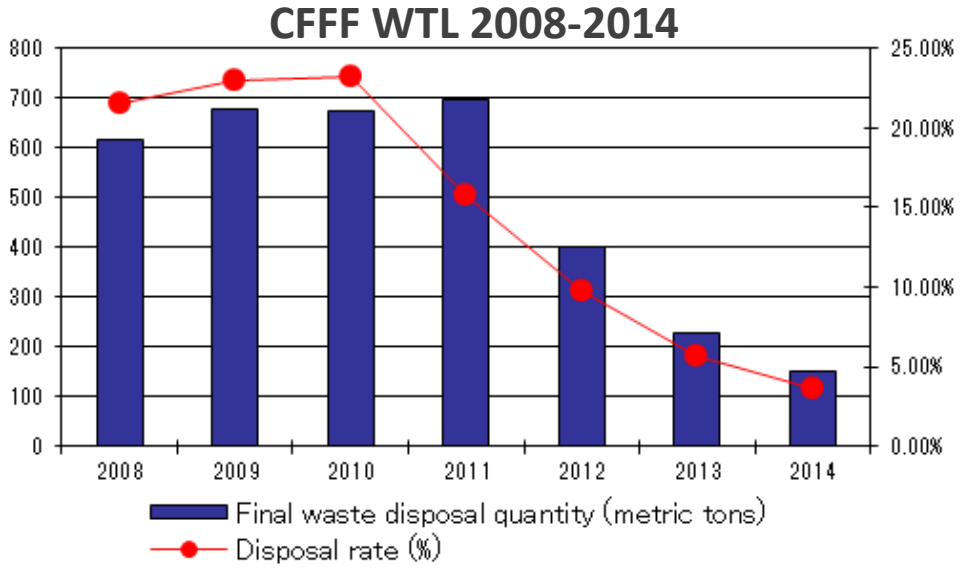
$$\text{Percent} = \frac{total\ materials\ recycled, composted, reused, etc}{total\ waste} \text{x} 100\% = \frac{129{,}198\ kg}{146{,}317\ kg} \text{ x } 100\% = \mathbf{88.3\%}$$

585	C1m+D1m+F1m	Total recycled amount(material)	(kg)	129198	124096	157271	151239	207296	165737	121336	13
586	C1t+D1t+F1t	Total recycled amount(thermal)	(kg)	0	6358	0	3106	0	5469	0	
587	(C1m+D1m+F1m)/A1	Total recycled rate(material)	(%)	88.30%	92.87%	89.40%	92.78%	95.92%	92.86%	87.38%	8
588	(C1t+D1t+F1t)/A1	Total recycled rate(thermal)	(%)	0.00%	4.76%	0.00%	1.91%	0.00%	3.06%	0.00%	
589	(C1+D1+F1)/A1	Total recycled rate(material+thermal)	(%)	88.30%	97.63%	89.40%	94.68%	95.92%	95.92%	87.38%	8
590	G1	Direct final disposal amount	(kg)	17119	3168	18643	8666	8818	7282	17527	1
591	G1c	---Payment2	USD, $	$747	$24,868	$814	$15,474	$385	$4,312	$765	$
592	H1	Final disposal amount after intermediate treatme	(kg)	0	0	0	0	0	0	0	
593	G1+H1	**Total final disposal amount (FDA)**	(kg)	17119	3168	18643	8666	8818	7282	17527	1
594	C1c	Total sale of waste with value	USD, $	$0	$672	$629	$0	$7,370	$724	$148	$
595	D1c+E1c+G1c	---Total payment	USD, $	$8,705	$65,090	$9,894	$59,772	$29,427	$73,511	$8,468	$
596	(G1+H1)/A1	**Final disposal rate**	(%)	**11.7%**	**2.4%**	**10.6%**	**5.3%**	**4.1%**	**4.1%**	**12.6%**	**1**
597		Site Production/Activity level**--->	**equivalent units**	293	200	287	313	301	254	300	
598		Waste generation intensity (kg/activity unit)	<------	499.374	668.110	612.941	520.804	717.985	702.715	462.877	47
599		**FDA Sustainability Index Subscore (YTD)**		0.586	0.413	0.501	0.437	0.406	0.388	0.418	
600											
601											
602		**JPY/USD Conversion rate:**	Currency Conv	119.87	124.16	122.16	123.93	121.23	119.77	120.62	12

Tracking and Measurement
Waste To Landfill (Final Disposal Rate)



CFFF WTL Goal = 3.04%



FDR has decreased overall and will continue. Changes to CFFF sludge prediction methodology caused a setback in FY15.

Westinghouse

Tracking and Measurement
Benchmarking

- WTL / FDR
- Diversion Rate
- Per capita

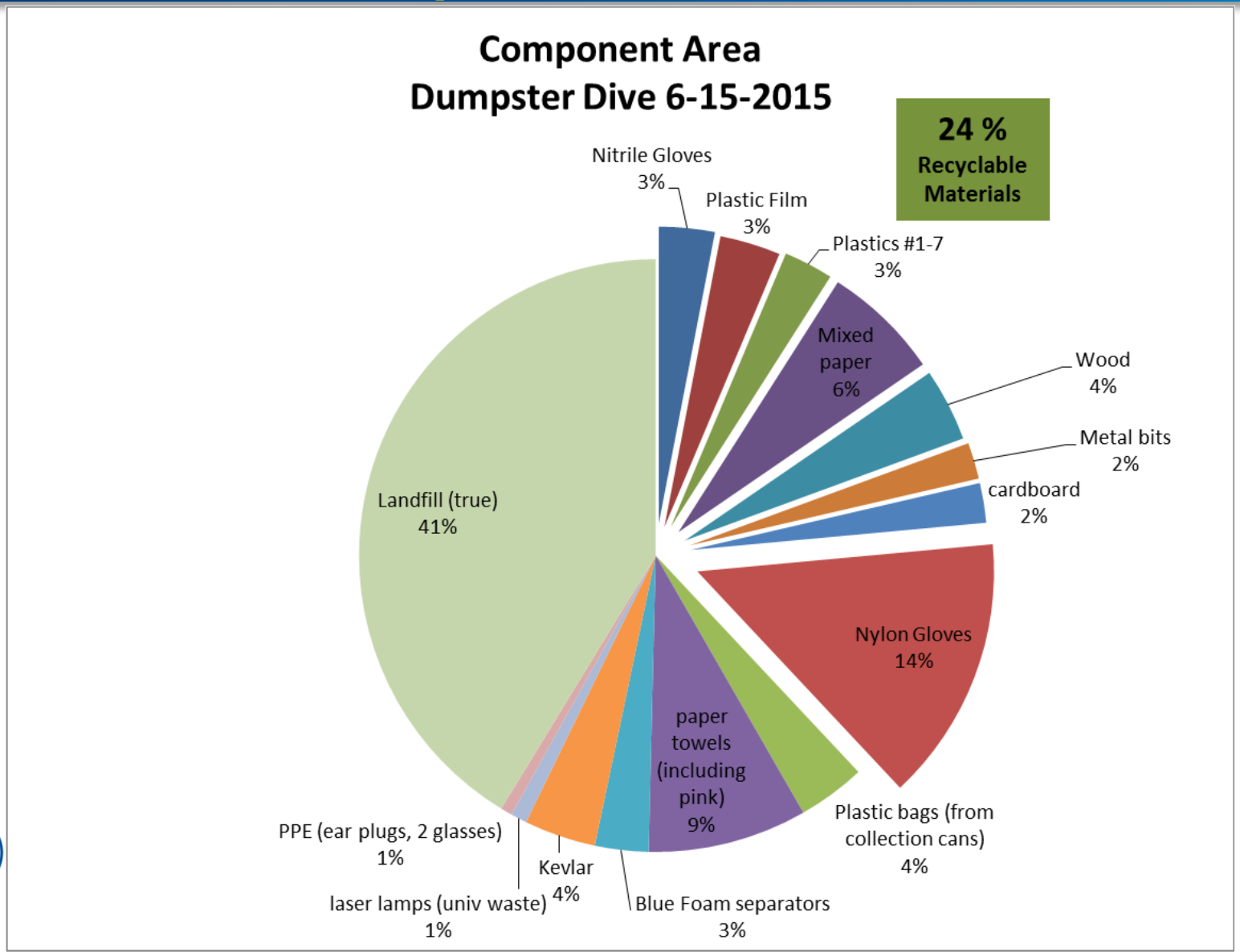
  (generation and reduction)
- Normalization with production metric
- Cost

  (including source reduction and other avoided costs)

Westinghouse

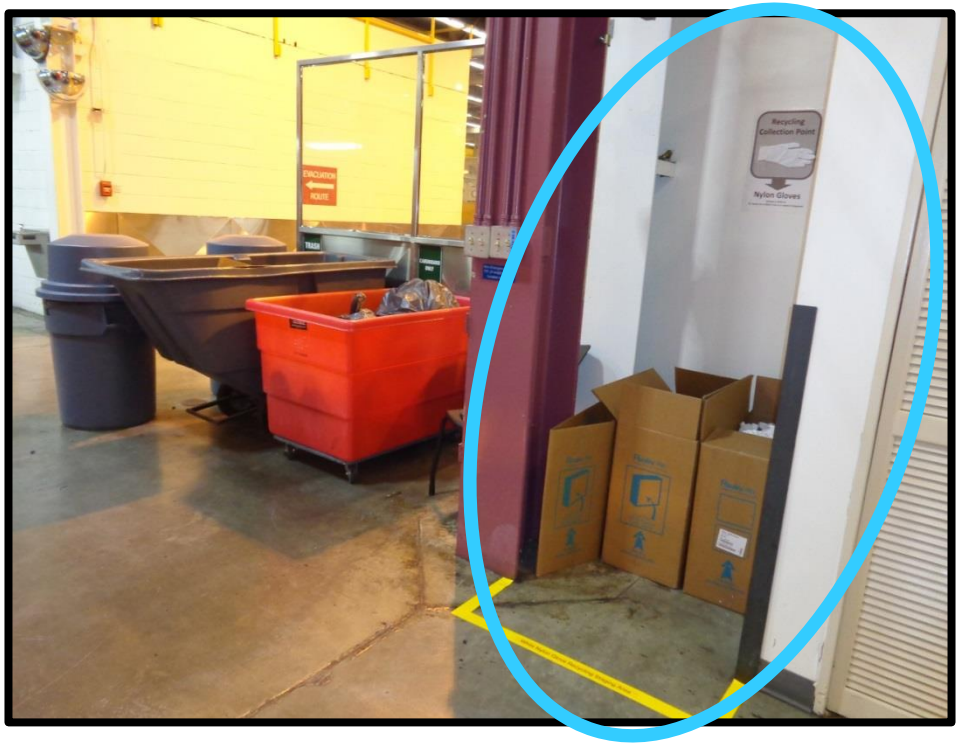
Reassess

Reassess
Area Focus: Component Area



Reassess-Communicate
Nylon Glove Recycling

Maintenance Corner beside Lamp Closet (central collection)



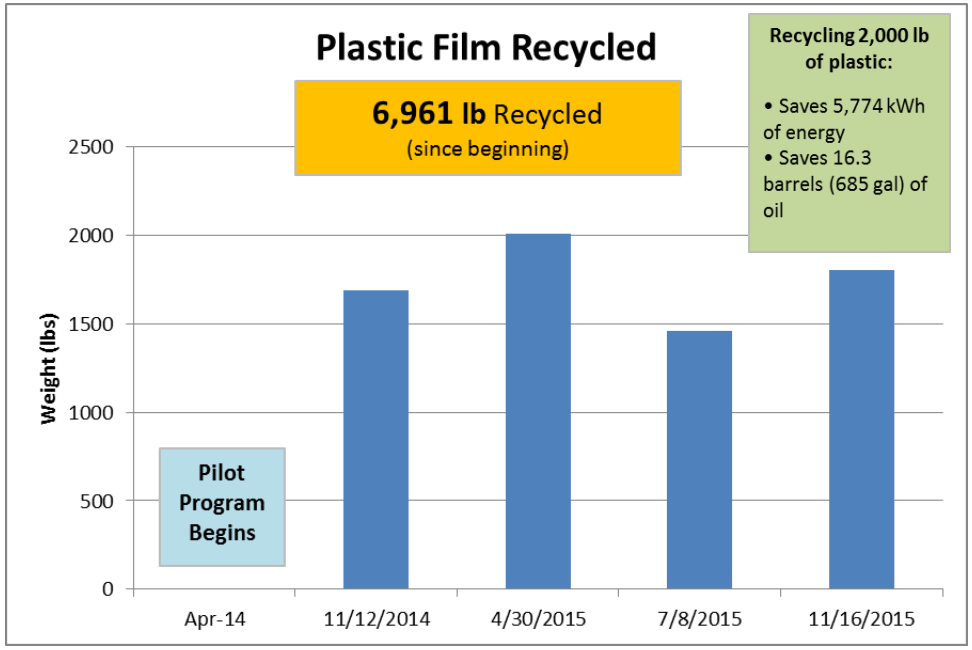
- 14% Component Area Waste (by weight)
- 6% of Total Site Waste
- Final Assembly began the pilot program in May 2015
- All other Mechanical Areas begin collection in August 2015
- Area personnel are responsible for taking the gloves to the central collection point

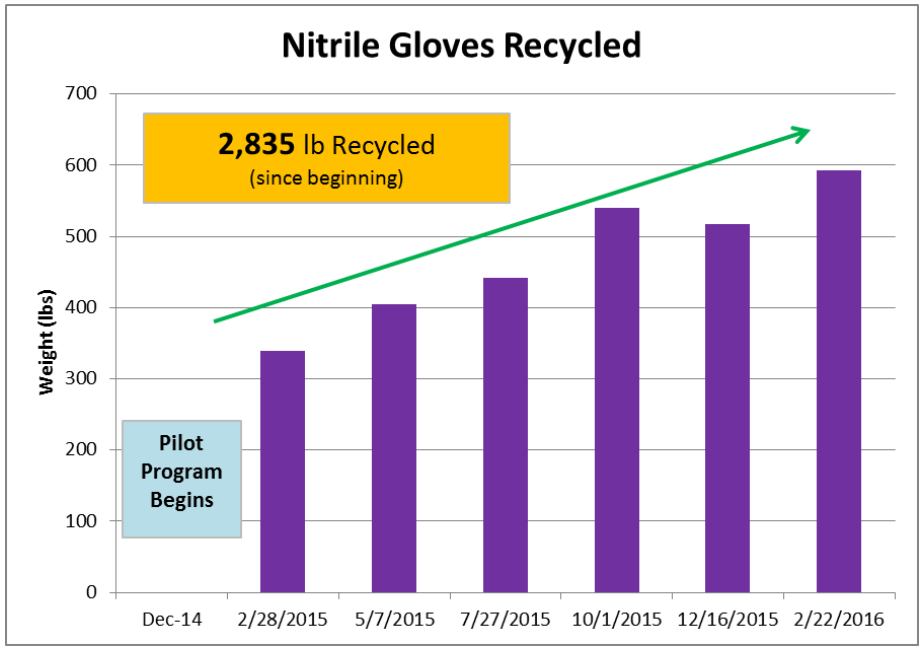
100% collection for recycling = **588 lb/mo or 7,056 lb annually** diverted from landfill

Westinghouse

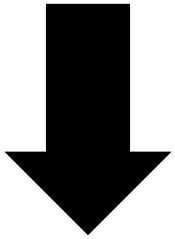
Reassess-Communicate

Recycle Rates: Plastic Film & Nitrile Gloves





= 2%



FY15 Waste to Landfill

Westinghouse

Diana P. Joyner
joynerdp@westinghouse.com
803.647.1920 (office)