

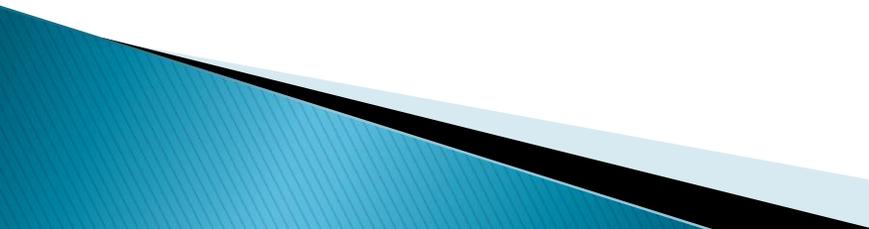
A Proposed Effectiveness Performance Criteria for HHW Collection Programs

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Tight Times Demand Closer Scrutiny of Programs

- ▶ Municipal Solid Waste Manager might want to evaluate the performance of
 - Recycling
 - Composting
 - E-waste
 - Construction and Demolition Debris
 - Traditional HHW Collection Programs
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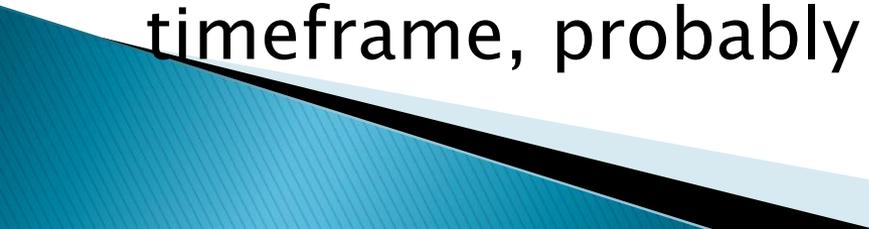
Typical Solid Waste Program Evaluation Criteria

- ▶ Traditional Recyclables are a large proportion of MSW stream and relatively easy to measure daily, weekly, and annually, e.g.:
 - Recycling Programs: set out rates, pounds recycled per customer, % of waste diversion, tons diverted per year
 - Composting programs can use same criteria
- ▶ Most other solid wastes can be evaluated with similar evaluation criteria

What About HHW Collection Program Performance?

- ▶ Weekly set-out rates?
 - This typically does not apply to HHW programs
- ▶ Percentage waste diverted?
 - Difficult as HHW is very a small fraction in solid waste characterization studies, usually less than 1%
 - A significant quantity of HHW is disposed of improperly through storm drains, sanitary sewer, dumped on ground, etc. and is not revealed via solid waste characterization studies
 - Without a baseline generation value for HHW it is very difficult to directly calculate percent diverted.

Other Issues in Evaluating HHW

- ▶ A household can easily store many years of HHW
 - ▶ HHW is often generated because of an “event”
 - Spring cleaning,
 - Cleaning following the death of a family member
 - Major remodeling project or occasional maintenance
 - Change of residence
 - ▶ These generation events are typically not weekly, monthly or even annually, often multi-year
 - ▶ Therefore, the appropriate performance measurement criteria must be based on a longer timeframe, probably some number of years
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Managers Dilema

- ▶ HHW collection programs are valuable to my community
 - ▶ I don't have traditional solid waste measurement criteria to gage the relative effectiveness of HHW collection programs
 - ▶ I need to find a novel criteria to evaluate the effectiveness of HHW collection programs
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Ideas for basis of HHW evaluations

- ▶ Total of all hazardous products sold
 - Doesn't indicate how much product was used vs. waste
 - Expensive retail sales data, may change over time
- ▶ Statistically significant survey of HHW in homes
 - Very expensive, subjective regarding what may or may not be used prior to declared a waste by the homeowner
 - Need to have a well defined definition of HHW and MSDS' and other sources of HW would be challenging
- ▶ Develop an estimate of the average age of all HHW generated. Needs to be:
 - broadly representative of HHW generation
 - consistently purchased product that often becomes HHW

What products might have data to represent the average age of HHW?

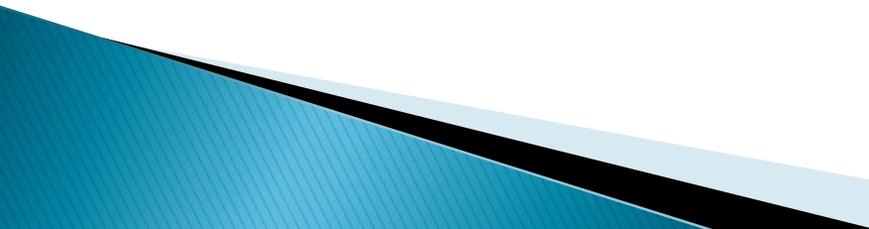
- ▶ Most household cleaners, pesticides, used oil do not have dates of manufacture to easily determine their age.
- ▶ Architectural paint is an exception –
 - Manufacturers have been required to date stamp their consumer paints due to VOC rules of the clean air act for many years, and many did so previously for Q.C.
 - Paints are a traditional HHW and one of the largest proportions of HHW
 - Paints might be representative of the average age of all HHW, but it certainly represents the 30–55% of the HHW that is paint. It might be a good HHW proxy.

Statewide Paint Estimates as Proportion of HHW

- ▶ From the Paint Product Stewardship Initiative

State	Paint as % of HHW
California	34 - 43%
Iowa	33%
Washington	43.6%
Wisconsin	30.9 - 56%

National Paint Product Stewardship

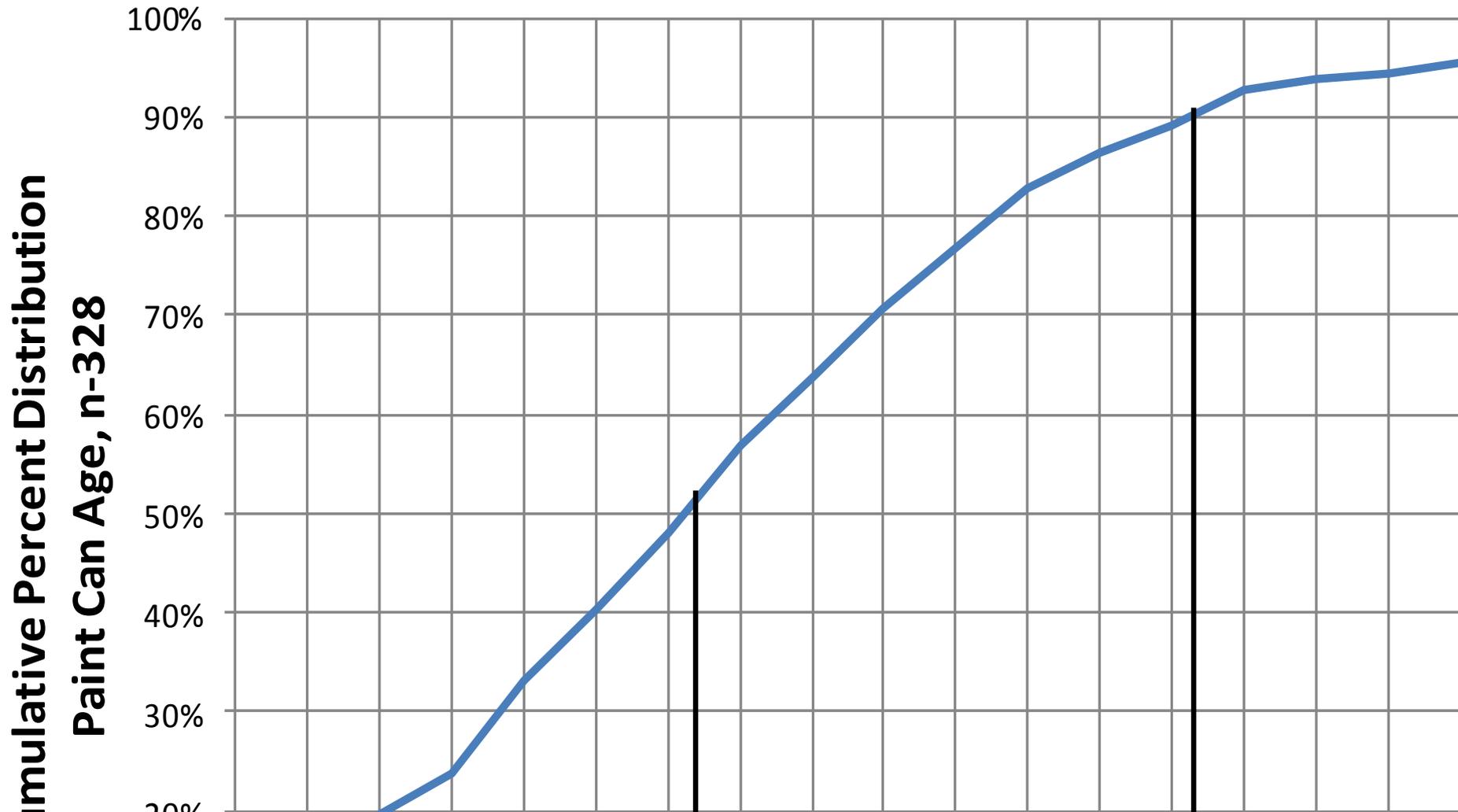
- ▶ Performed a study of the age of paint delivered to five local community HHW programs
 - ▶ 328 paint cans provided useable date codes.
 - ▶ The proportion of latex to oil-based paints was 54.3% to 45.7%, respectively, a larger proportion of oil-based paints than expected
 - ▶ An age of paint profile was developed
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Age of HHW Paint Profile

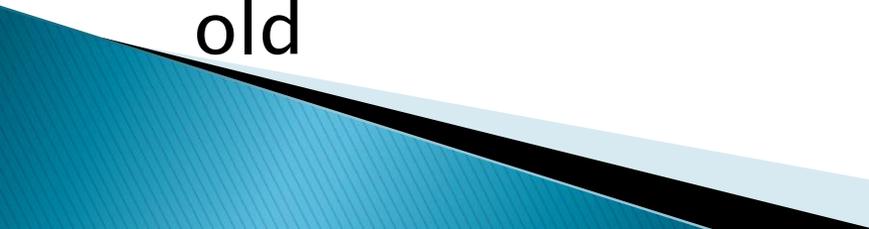
Paint Age, Yrs	Percentage of Paint Cans		Paint Age, Yrs	Percentage of Paint Cans
0	2.4		13	2.7
1	8.2		14	3.4
2	9.1		15	1.2
3	4.0		16	0.6
4	9.5		17	1.2
5	7.0		18	0
6	7.9		19	0.6
7	8.8		20	0.3
8	7.0		21	0.3
9	6.7		22	0.3
10	6.1		23	0.3
11	6.1		24	1.5
12	3.7		25+	0.9

Graphed Paint Age Profile

HHW Paint Age Cumulative Percenta



Statistical Results

- ▶ Average age of HHW paint is 7.4 years old, this can be considered the periodicity of the disposal cycle
 - ▶ Greater than 50% of paint is seven years of less
 - ▶ Greater than 90% of paint is younger than 14 years old
 - ▶ Less than 1% of HHW paints are over 25 years old
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Calculating Effectiveness

- ▶ Assume HHW paint age is generally representative of the age of all HHW
 - ▶ Use the average age of HHW paint to represent the average age of all HHW
 - ▶ Assume the avg. age of HHW approximates the frequency of HHW delivered
 - ▶ Assume negligible effect of multiple-house loads
 - ▶ Use the annual participation rate of households in a services area in conjunction with the assumed average HHW age to calculate the effectiveness of the HHW program
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What are National HHW Participation Rates?

- ▶ In a national 2005 study of 25 HHW programs in the US it was found that the annual participation rate ranged between 2% to 24% of households in the program service territory, with a median of 7%.

From: "Comparison of Household Hazardous Waste Programs", Portland Regional Environmental Management (Portland Metro) by Cascadia Consulting Group, Fall 2005, p. 14

CA Specific Examples

- ▶ A similar study of seven selected California HHW programs in 2007 found annual participation rate between 2.1% and 13.1%.
- ▶ This variability is not only program/jurisdiction specific but varies by location within jurisdictional boundaries.
- ▶ Sonoma County, showed that for the entire county the participation rate was 8.3%
- ▶ However in three areas within the county the participation rate varied between 4% to 69%.
- ▶ The area of 69% participation rate was in the area surrounding the permanent collection facility and the outlying areas saw a steep drop in participating households who were served only by occasional collection events

- Sonoma HHW Program Benchmarking and Program Evaluation Study, Sweetser & Associates and Special Waste Associates, January 2007, accessed at:
http://www.recyclenow.org/pdf/reports/sonoma_hhw_assessment_final_2007.pdf.

Using Participation Rates in Collection Effectiveness

- ▶ Assuming that an average HHW program can achieve often achieve 7% annual household participation rates in the service area, we can multiply that by the estimated 7.4 years disposal cycle of HHW to arrive at an estimated effectiveness of 51.8% HHW participation rate for the disposal cycle.

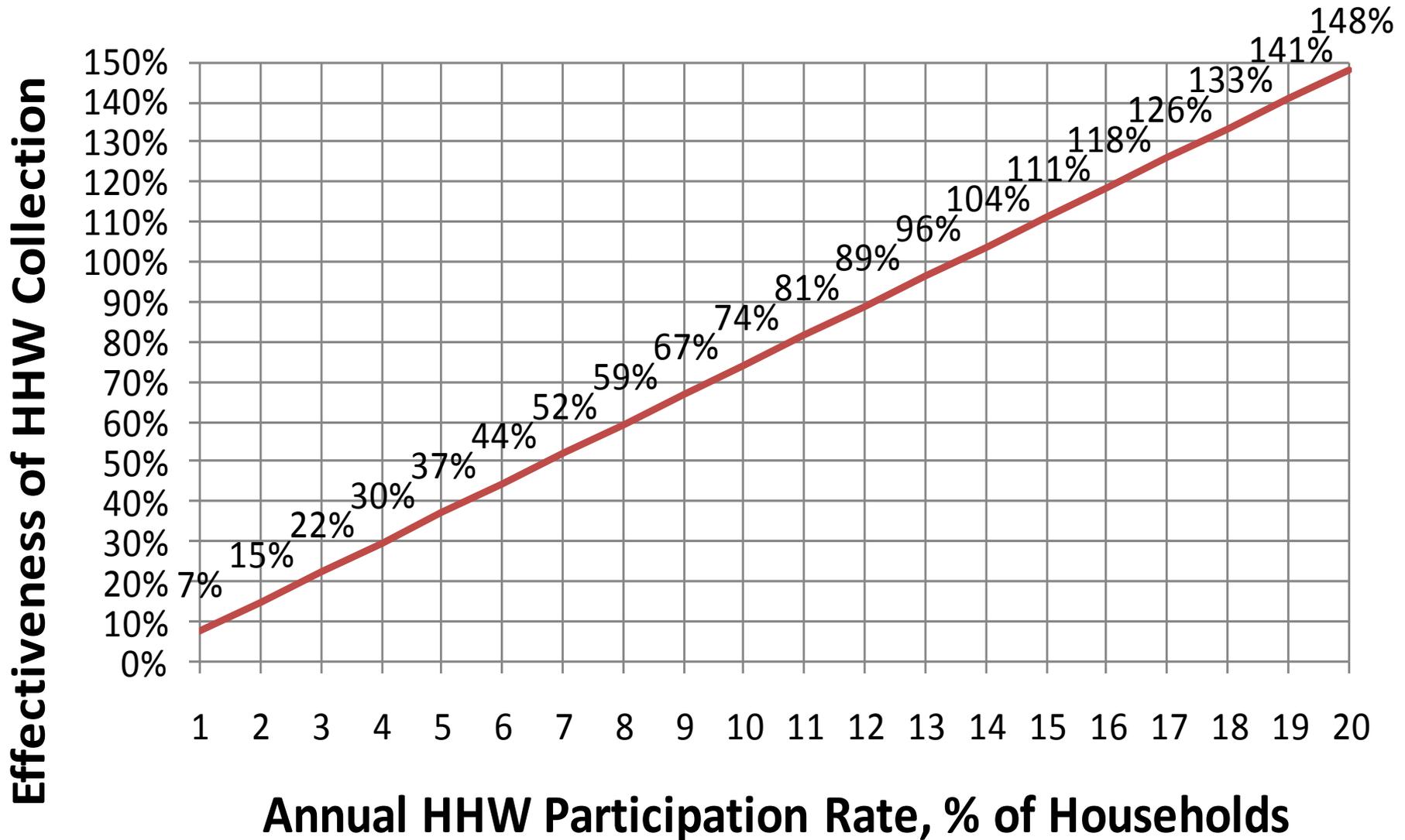
Proposed Effectiveness Calculation

- ▶ **Formula: $PPR\% \times 7.4 = HHW_{Eff.}\%$**
- ▶ **Where:**
 - **PPR%** is the Annual Participation Rate for the service area in a year
 - **7.4** is the assumed disposal cycle for HHW, in years
 - **$HHW_{Eff.}\%$** is the Estimated Percent Effectiveness of the HHW collection program in a year
- ▶ **HHW Effectiveness calculation example:**
 $7.0\% \text{ (avg. ann. participation)} \times 7.4 = 51.8\%$

Practical Use of Proposed Formula

- ▶ Using a constant multiplier and the higher end of participation rates can estimate effectiveness over 100%
 - ▶ At about 14% annual participation rates you will calculate about 100% effectiveness
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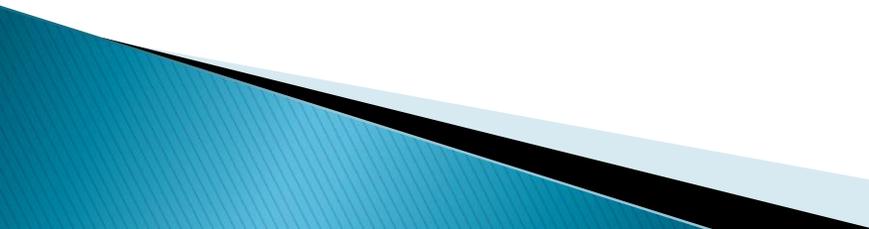
HHW Collection Effectiveness



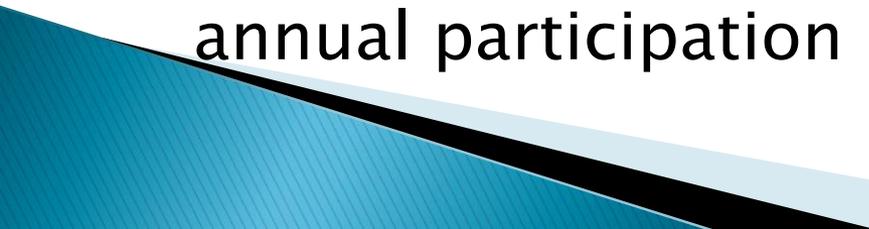
Some CA 2009 HHW Collection Program Examples

Jurisdiction	Percent Participation	Est. Effectiveness
San Mateo County	2.7%	20%
San Francisco	3.4%	25%
San Bernardino	7.5%	55%
Santa Cruz County	11.5%	85%
Central Contra Costa Sanitary District	14.4%	107%

Possible Reasons for $>100\%$ Effectiveness Estimates

- ▶ Increasing new customers \Rightarrow temporary increase in participation
 - ▶ Actual average age of HHW non-paint is older than average HHW paints
 - ▶ Customers bring in HHW more frequently than the average age of their HHW
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Advantages of this HHW Collection Effectiveness Criteria

- ▶ Does not rely on difficult to estimate HHW generation or disposal rates
 - ▶ Does not rely on methods that are not applicable to the generation patterns peculiar to HHW
 - ▶ Simple calculation based on existing participation ratios which are easy to accurately measure
 - ▶ Allows comparisons between programs
 - ▶ Allows management to track meaningful progress with a reasonable end point, 14% annual participation
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Next Steps

- ▶ Assume this new HHW collection effectiveness method is valid and strive for long-term performance of 14%.

OR

- ▶ Develop an alternative method for estimating effectiveness of HHW collection programs
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Thank you very much!

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