



Pesticide Packaging Recycling Rate Study

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***TPSA 16th Annual Pesticide Stewardship
Conference***



Research Objective

Develop a credible estimate of the USA recycling rate for all plastic packaging used for liquid formulated pesticide in 2013.

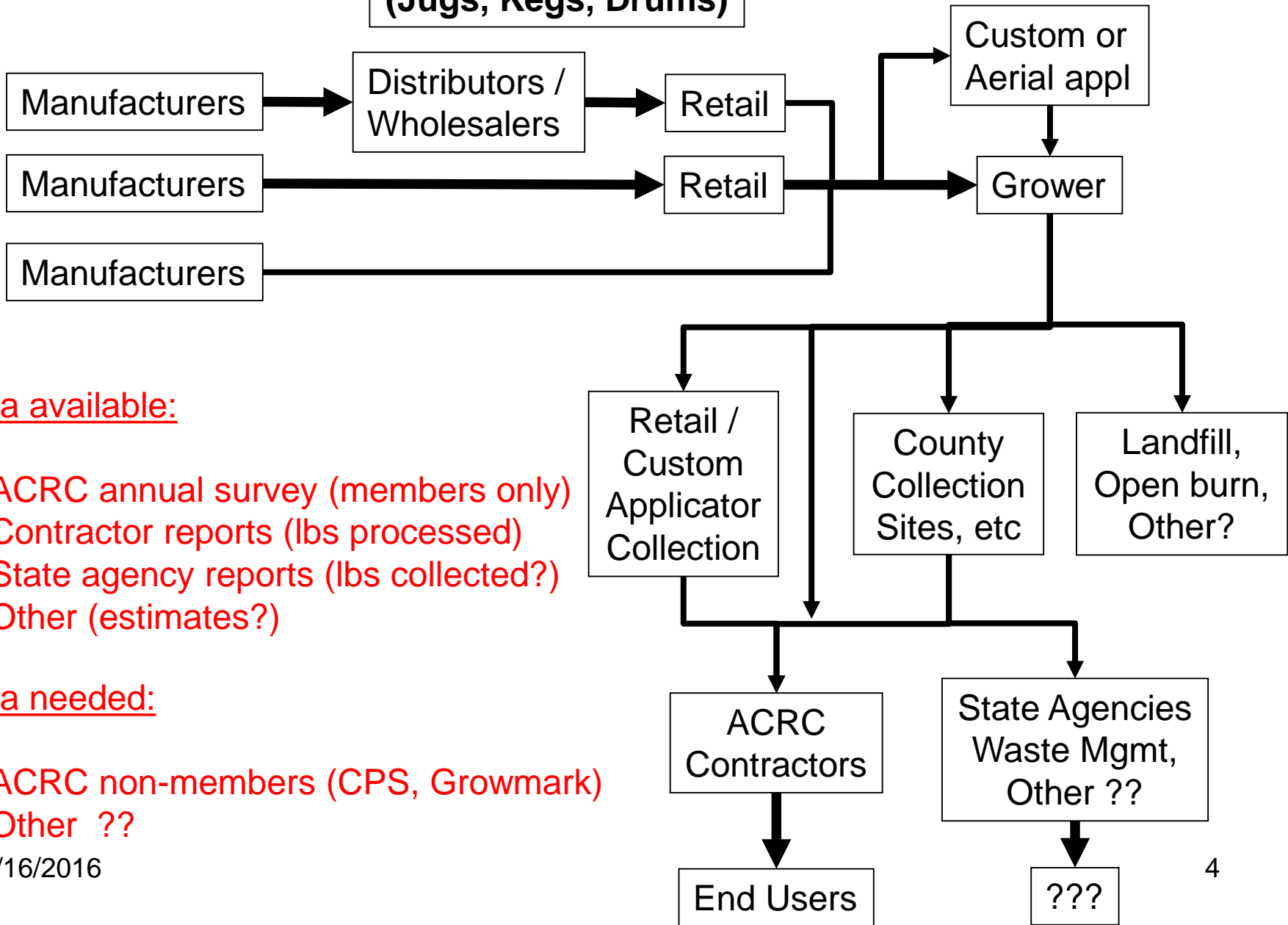


Process Used

- 1. Developed “flow maps” for IBC use and post use management**
- 2. Obtain bulk packaging data from credible sources:**
 - Freedonia (market research firm)
 - Reusable Industrial Packaging Association (RIPA)
 - ACRC survey of member companies
 - Composite IBC manufacturers and recyclers*
 - Related industry experts
 - USEPA
- 3. Analyze data and calculate estimates of annual sales and recycling rates**

*Mauser USA, LLC, IBCNA, Tri-Rinse, Inc. and FarmChem Corp

**HDPE < 56 Gal
(Jugs, Kegs, Drums)**



Data available:

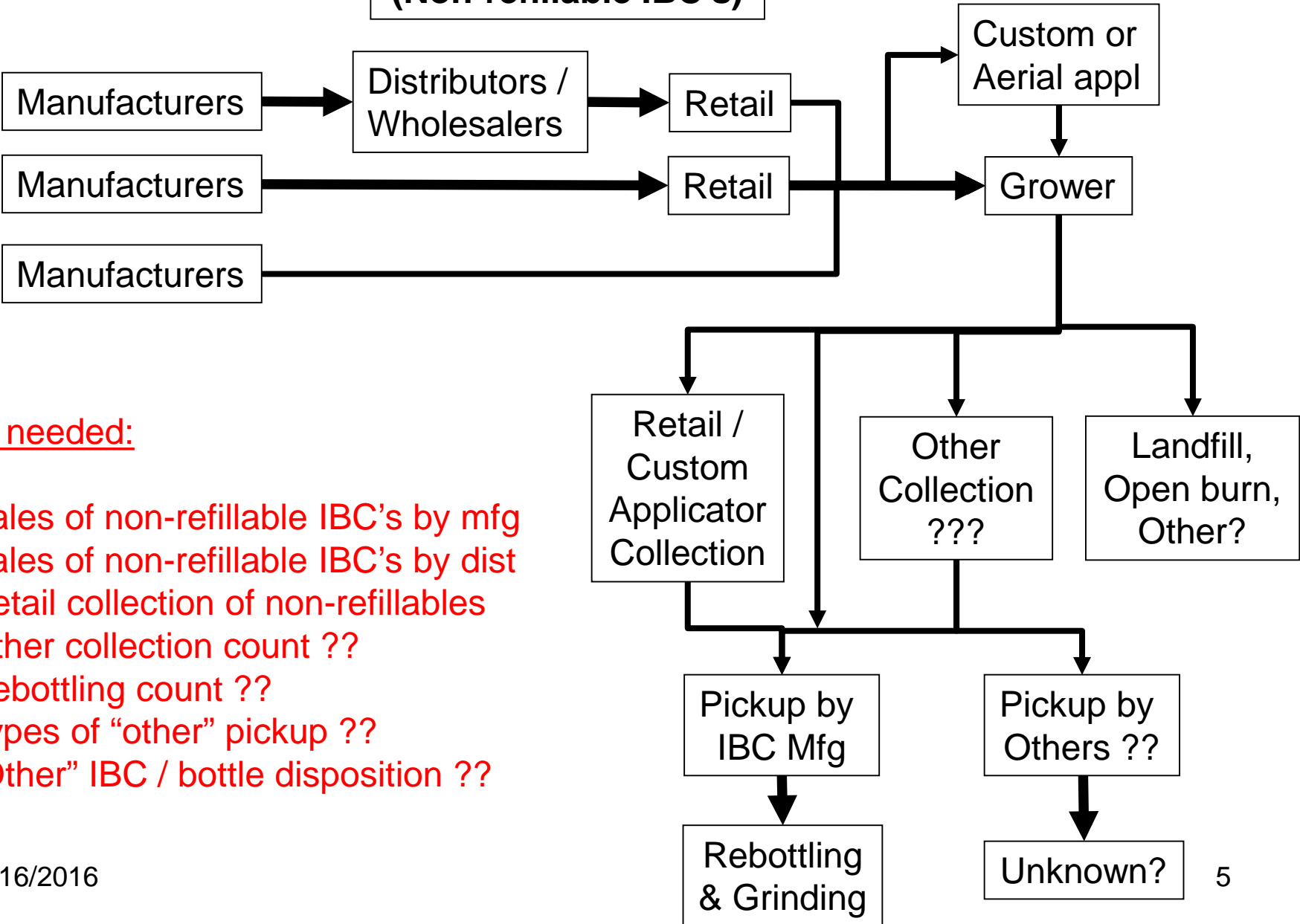
- ACRC annual survey (members only)
- Contractor reports (lbs processed)
- State agency reports (lbs collected?)
- Other (estimates?)

Data needed:

- ACRC non-members (CPS, Growmark)
- Other ??

**HDPE > 56 Gal
(Non-refillable IBC's)**

*IBC designated as "Non-refillable" by
Manufacturer or Distributor*

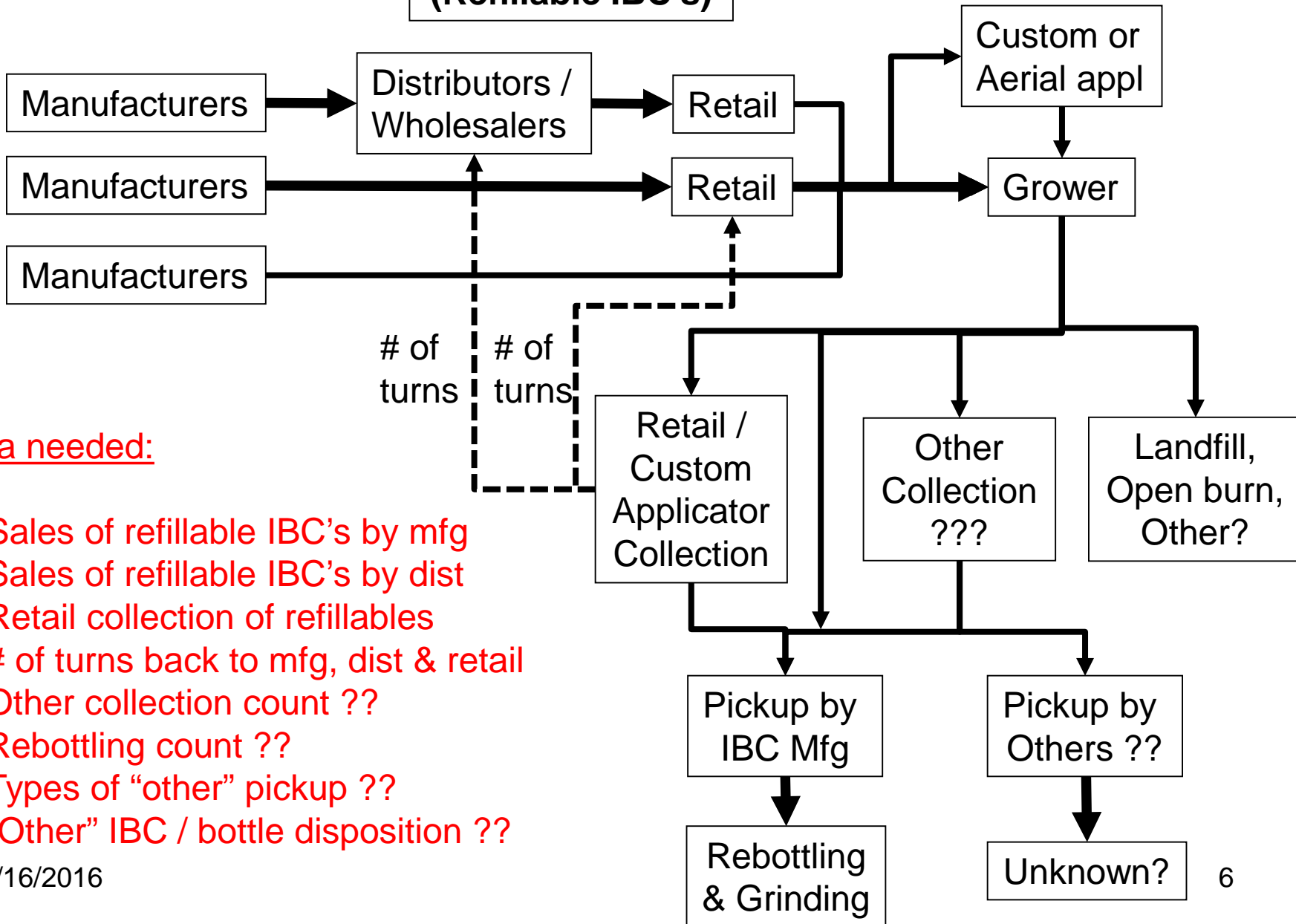


Data needed:

- Sales of non-refillable IBC's by mfg
- Sales of non-refillable IBC's by dist
- Retail collection of non-refillables
- Other collection count ??
- Rebottling count ??
- Types of "other" pickup ??
- "Other" IBC / bottle disposition ??

**HDPE > 56 Gal
(Refillable IBC's)**

*IBC designated as "Refillable" by
Manufacturer or Distributor*

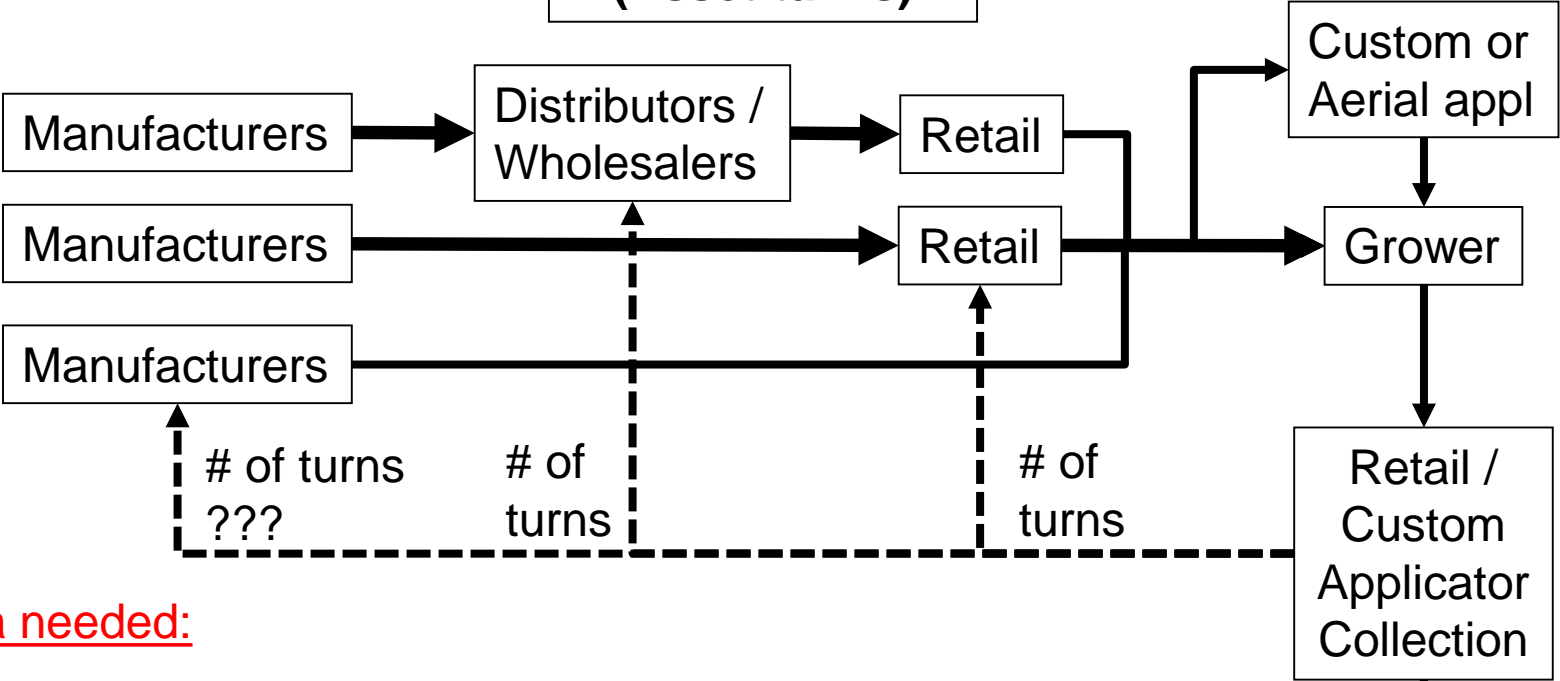


Data needed:

- Sales of refillable IBC's by mfg
- Sales of refillable IBC's by dist
- Retail collection of refillables
- # of turns back to mfg, dist & retail
- Other collection count ??
- Rebottling count ??
- Types of "other" pickup ??
- "Other" IBC / bottle disposition ??

**HDPE > 56 Gal
(Asset tanks)**

*Asset tanks owned by
Manufacturer or Distributor*



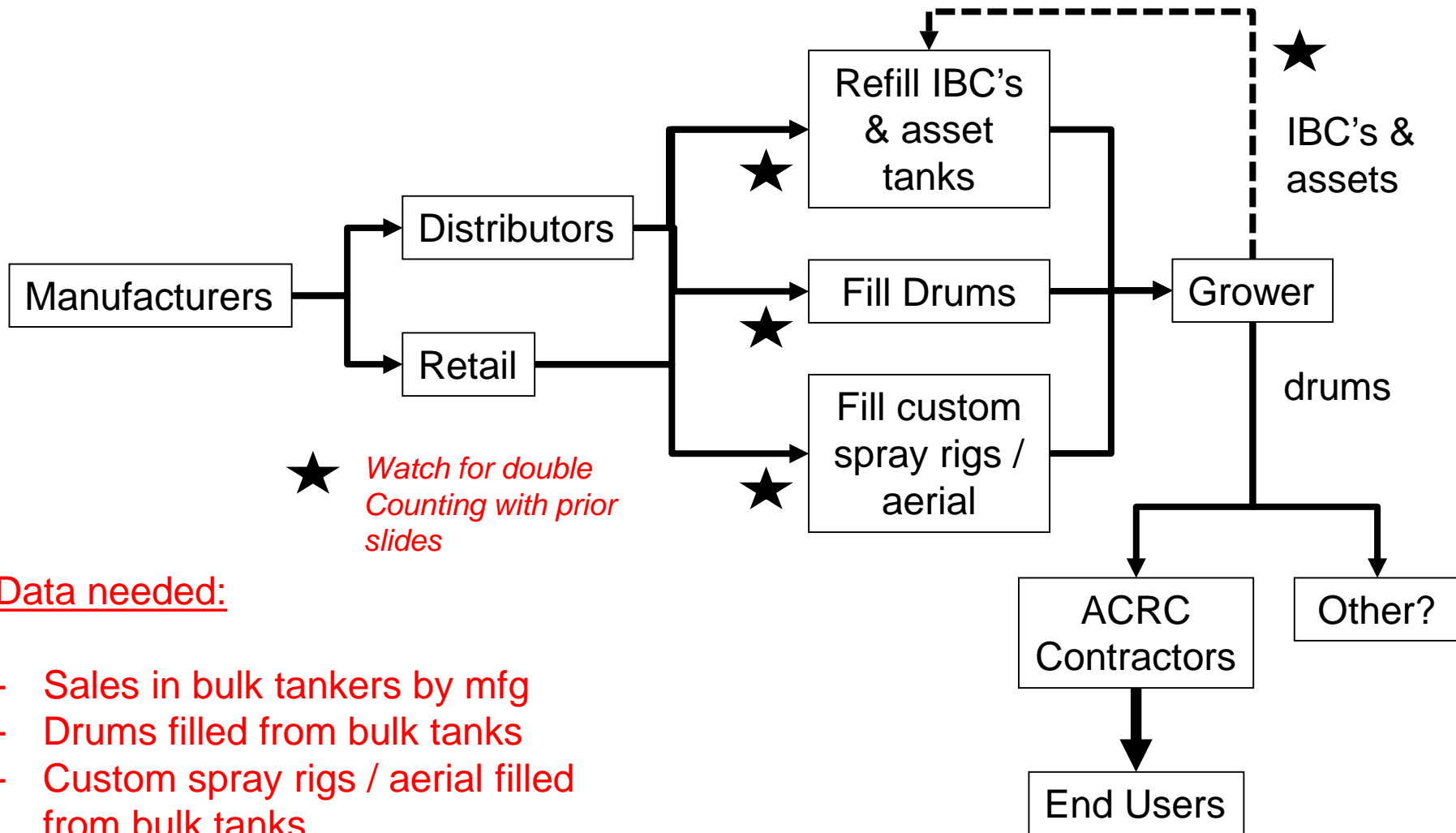
Data needed:

- Sales in asset tanks by mfg (if any ??)
- Sales in asset tanks by distributors
- Sales in asset tanks by Retail
- Avg # of turns back to mfg, dist, retail
- Collection lbs by “managed collection” providers
- Are there other recycle outlets for old asset tanks?

2/16/2016

**HDPE > 56 Gal
(Bulk tank trucks)**

*Bulk tanker trucks shipped by
mfg to distributor or retail for
bulk tank filling*



Data needed:

- Sales in bulk tankers by mfg
- Drums filled from bulk tanks
- Custom spray rigs / aerial filled from bulk tanks



Assumptions Required for Calculations

1. Liquid pesticide sold in bulk tankers

% custom applied

% repackaged in IBCs

2. IBC average “turn rate

3. IBC recycling rate



Assumption #1

- **60% of pesticide sold in bulk tankers is custom applied**
 - The custom application rate for the Midwest has traditionally been in the 55-65% range.



Assumption #2

- **40% of pesticide sold in bulk tankers is repackaged in IBCs**
 - Since 60% of pesticide sold in bulk tankers is custom applied, the remaining 40% is repackaged in IBCs
 - This assumption was backed up by sales data from ACRC member companies



Assumption #3

- **IBC average “turn rate “ is ten times**

While the number of turns (refills) varies widely for different ag chemicals we have been told that the USEPA used ~ten turns as the average when drafting regulations for refillable containers in the Container and Containment Rule published in 2006.



Assumption #4

- **IBC recycling rate = 75%**
 - ✓ Reusable Industrial Packaging Association (RIPA) data suggests that IBC industrywide recycling rate is ~71%
 - ✓ All ACRC member companies offer IBC return/recycling programs to their customers
 - ✓ IBC recycling infrastructure is well established
 - ✓ Consensus of industry professionals



Calculation: Pounds of Plastic Used for Pesticide Sold in Bulk* (2013)

1. ACRC survey of ACRC member company **bulk sales**

Direct sales of pesticide in IBCs= 32.0 mm gal (**delivered in 196,000 IBCs**)

Sales of pesticide in bulk tanker= 141.5 mm gal

Total sales in bulk = 173.5 mm gal

2. Number of IBCs used for **repackaging of product sold in bulk tanker**

Industry consensus:~40% of bulk tanker sales is repackaged into IBCs before application:

0.40 x 141.5 mm gallons in bulk tankers= 56,600,000 gal

Industry consensus is that, on average, an IBC used for repackaging does ten turns (gets refilled ten times in its five year useful life; twice annually). Thus the number of IBCs required for 56.6 mm gal =

56.6 mm gal/(2 X 265 gallons per average IBC) = 107,000 IBCs

3. Total IBCs used = 196,000 (direct sales) + 107,000 (repackaging)= 303,000

4. Total lbs. of plastic used in IBCs for direct sales and repackaging = 15.9 mm lbs.**

*Bulk is defined as containers >55 gals and bulk sales in tankers

** 265 lbs./asset IBC; 35 lbs./composite IBC; 22 lbs./unit for smaller IBCs



Pounds of **IBC** Plastic Recycled Annually

- **Total lbs. of plastic used for IBCs for direct sales and repackaging =15.9 mm lbs. (Calculation on previous slide)**
- **For IBCs assume ~75% are recycled per industry consensus**
- **Estimated pounds recycled= 0.75×15.9 mm lbs.= 11.9 mm lbs.**



Calculation of 2013 Recycling Rate for **Pesticide Containers <56 gallon (ACRC Program)**

- **Pounds of packaging used:**
ACRC annual survey of members = 30.7 mm lbs.
Non ACRC producers (estimated) = 3.1 mm lbs.
TOTAL = 33.8 mm lbs.
- **Pounds of containers recycled:**
ACRC program (2013) = 9.14 mm lbs.
Other known programs = 1.26 mm lbs.
TOTAL = 10.40 mm lbs.
- **Recycling rate = 10.4 mm lbs. / ~33.8 mm lbs. = 30.8 %**



Calculation of Overall Plastic Packaging Recycling Rate for Liquid Pesticide Sales

Total lbs. of plastic used for packaging:

15.9 mm lbs. for bulk sales (Calculation on slide #9)

33.8 mm lbs. for containers < 56 gallon (ACRC annual survey)

Total lbs. used= 49.7 mm lbs.

Total lbs. recycled:

10.4 mm lbs. of containers < 56 gal (ACRC program)

11.9 mm lbs. of plastic used in IBCs (Calculation slide #10)

Total lbs. recycled= 22.3 mm lbs.

Plastic recycling rate= $22.3 \text{ mm lbs.} / 49.7 \text{ mm lbs.} = 44.9\%$



Calculation of Gallons of Pesticide **Delivered in Bulk** That is Delivered in **No** Packaging or Packaging That is Recycled

- Gallons of Pesticide Delivered in Bulk that is delivered in packaging that is recycled =

75% of gallons delivered by manufacturers **direct** to users in IBCs =
 $0.75 \times 32.0 \text{ mm gal} = 24.0 \text{ mm gallons}$

plus

75% of gallons delivered in **bulk tanker** that is repackaged (40% of gallons that are delivered in bulk tanker) =

$0.75 \times 0.40 (141.5) = 42.5 \text{ mm gallons}$

plus

100% credit for the gallons of product that is delivered in bulk and is **custom applied** (60% of gallons that are delivered in bulk tanker);

i.e. **no packaging used** = $0.60 \times (141.6) = 84.9 \text{ mm gal}$

Total = 24 mm gal + 42.5 mm gal + 84.9 mm gal = 151.4 mm gal



Calculation of Pesticide Container Recycling Rate (based on gallons delivered)

- **Total gallons of pesticide delivered :**
 - In containers < 56 gallon (from ACRC annual survey) = 99.3 mm gallons
 - Sold in bulk (ACRC special survey of bulk sales) = 173.5 mm gallons
 - Total gallons of pesticide delivered = 272.8 mm gallons
- **Container “gallons” recycled:**
 - For containers <56 gal= 30.8% recycling rate x 99.3 mm gal = 30.6 mm gal
 - For bulk sales* = $0.75(32) + 0.75(56.6) + 0.60(141.5) = 151.4$ mm gal
 - Total gallons delivered with no plastic or in plastic containers that are recycled=**
30.6 mm gal + 151.4 gal = 182.0 mm gal

Recycling rate (of packaging of total gallons delivered) =

182.0 mm gal sold in packaging that was recycled/272.8 mm gal sold = 66.7%

Stated in another way: 66.7 percent of liquid pesticide is delivered with no plastic packaging or packaging that is recycled.

***See slide #13 for detailed explanation and calculation**



Summary of Analysis & Results

- **Plastic packaging recycling rate= 44.9%**
- **Recycling rate (of packaging of total gallons delivered) = 66.7%**



Recycling Complements Other Industry Sustainability Initiatives

- **Industry is reducing the environmental impact of its product delivery systems by:**
 - 1. Integrating genetically modified crops into its cultural practices which often reduces the demand for traditional chemistries*
 - 2. Increasing efficacy of the product (reduced quantity needed to produce desired result)*
 - 3. Distributing increasing percentage of product in bulk (less packaging per unit of product delivered)*
 - 4. Recovering and recycling an increasing percentage of total packaging used.*