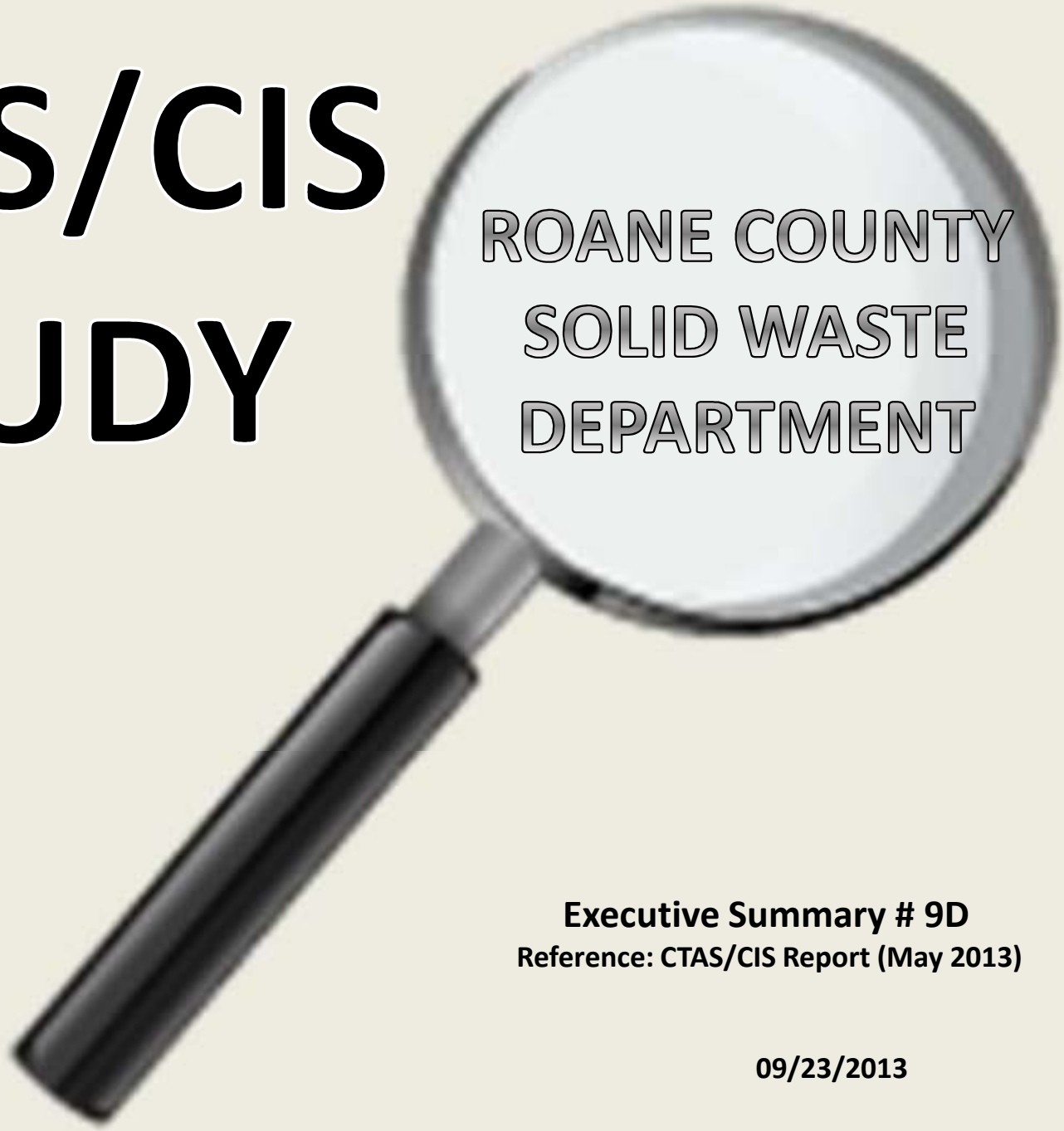
CTAS/CIS STUDY



Executive Summary # 9D

Reference: CTAS/CIS Report (May 2013)

09/23/2013

The Department of Solid Waste Mission Statement

The goal of the Solid Waste Department is to reduce waste by developing and enhancing recycling program while creating partnerships with local municipal governments, businesses, schools, civic groups and individual households. We will reduce waste, create jobs and educate the public on environmentally friendly waste disposal.

County Technical Assistance Service
Solid Waste Study

MAY 13, 2013

In February, 2013, County Technical Assistance Service(CTAS) evaluated a broad spectrum of processes that are part of the Roane County Solid Waste program. A corresponding report was submitted by Center for Industrial Services(CIS) specifically evaluating baling and recycling processes. Many observations along with suggested improvements were made.

Solid Waste Study
MAY 13, 2013

1. **Observation:** Consultants spent several days on site in mid April studying and making observations of the recycle operation.
2. **Economics:** Economic and Commodity comparisons were made between twenty County Solid Waste Programs.
3. **Performance:** Potential performance measures were identified at the Recycle Center and Convenience Centers.
4. **Best Practice:** Best practices were identified and recommendations were suggested.
5. **Photos and Diagrams:** Photos and diagrams were included in the study.

Report was submitted to the County Executive on May 20, 2013.

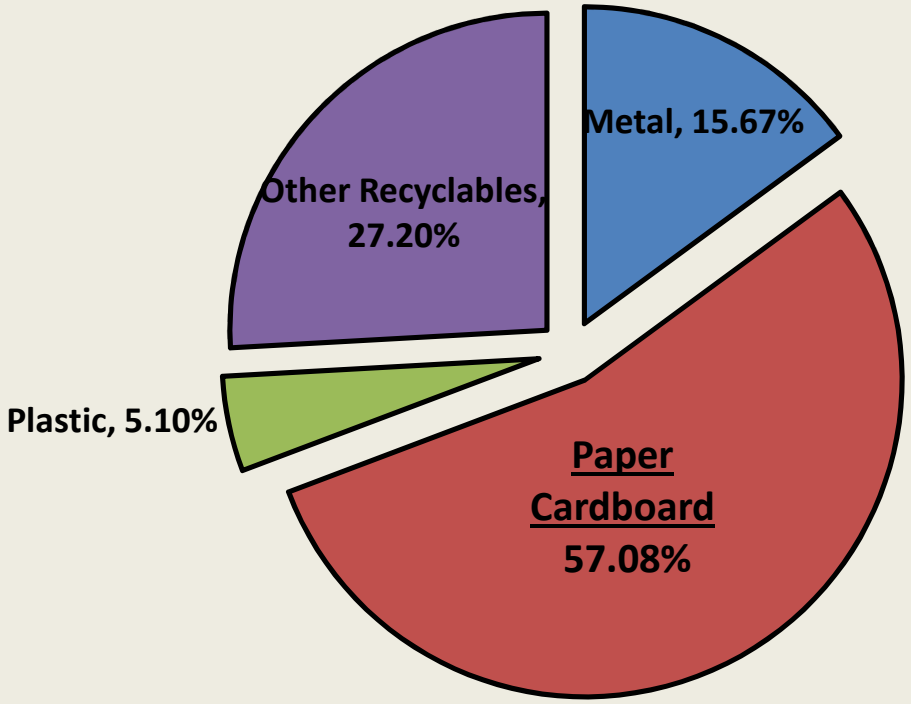
CTAS/CIS
Observation Facts

The CIS consultant spent two days studying the recycle centers daily operations. The following observations were made:

- The sorting and handling process for cardboard and plastics is greater due to “double handling”.
- Baler does not have an automatic tie requiring manual ties taking substantial amounts of time.
- Convenience Center Operators do not take the time to open bags of recyclables to reduce handling time at sorting facility.
- Convenience Center Operators do not monitor the contamination that is going into recycle containers increasing process time at the sorting facility.
- Sorting facility employees do not have a clear job description for daily responsibilities that will improve sorting process and safety.

Observation Facts

In 2011 calendar year, 57% of all processed recyclables consisted of cardboard or other fiber, 15% of the processed materials were metals, and a little over 5% were plastics (Number 1, Number 2, and mixed). The proposed tip floor redesign needs to account for the proportion of the work time devoted to each of these materials.



Total Revenue 2011
$284,829.00

CTAS/CIS
Observation Recommendations

- To remain a high performer in the recycling arena there needs to be a process to improve handling a process on both ***cardboard*** and ***plastics***.
- Purchasing a higher capacity baler with an automatic tie will minimize bottlenecks and improve safety.
- Recommendations for a redesigned recycle center operation floor to improve workflow and safety.
- The Bay Area Worker needs to be focused on the efficiency and workflow process underway on the tipping floor.
- Creating job descriptions that clearly assigns day to day responsibilities for facility and equipment maintenance, conducting best practices, shop housekeeping, or worker safety.
- Convenience Center operators need to help reduce contamination rates by closer observation and assisting residents.
- Addressing and educating residents and organizations about best practices, reducing the amount of trash that is mixed with recyclable materials. This will reduce handling and processing time to sort materials for baling.

Economic Comparison between 20 County Solid Waste Programs

Roane County was among the highest in several categories of an economic comparison between 20 county solid waste programs.

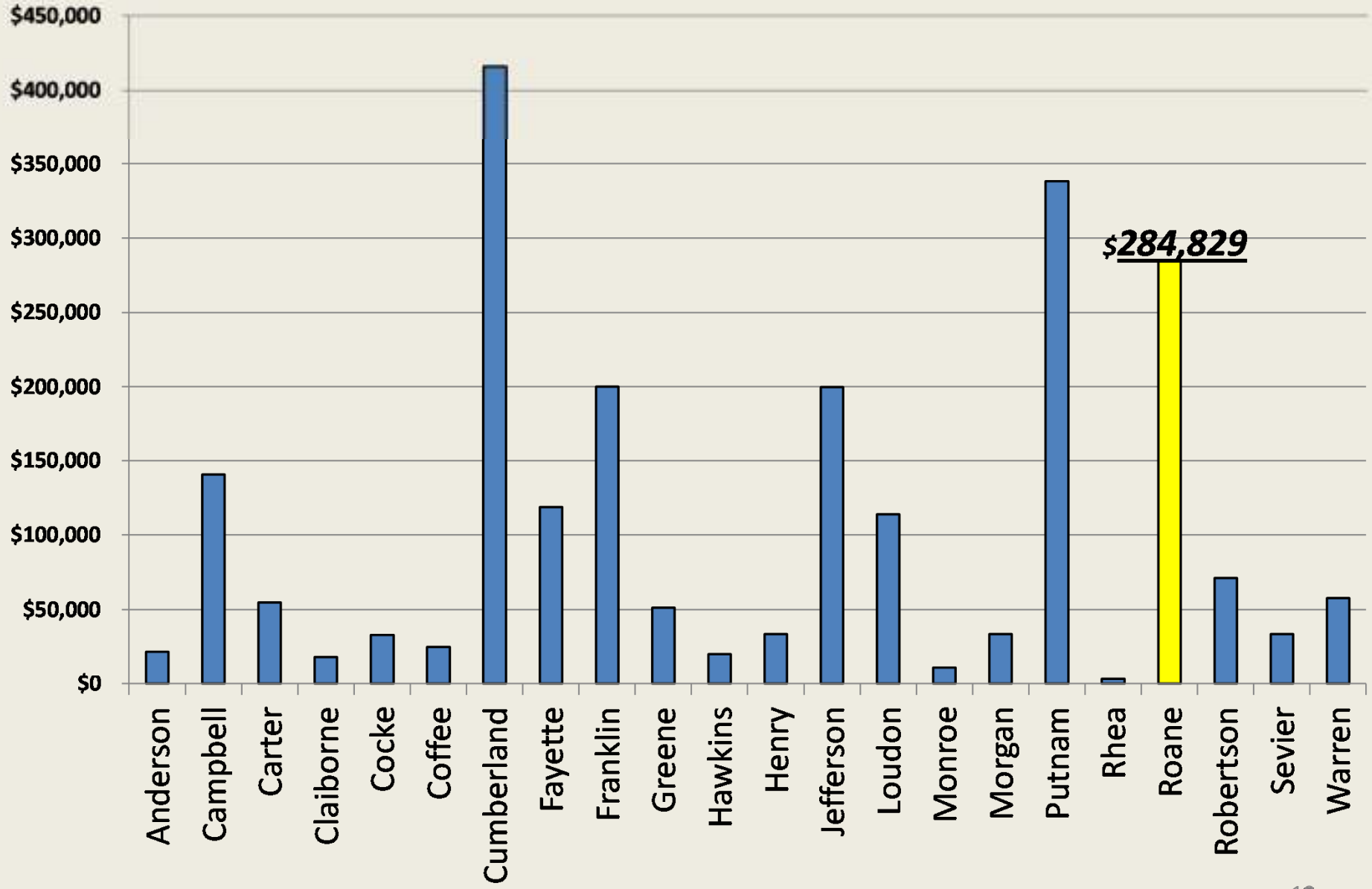
Categories for comparison are:

- Population
- Recycling Rate (Residential)
- Solid Waste (Tons)
- Solid Waste Expense
- Solid Waste Cost (Per Person)
- Total Recycled (Tons)
- Revenue From Recycling
- Recycling Revenue (Per Ton)
- Cost Savings (Per Person)=(Tipping fee $30/Ton Avoidance)+ Recycling Revenue)/Population

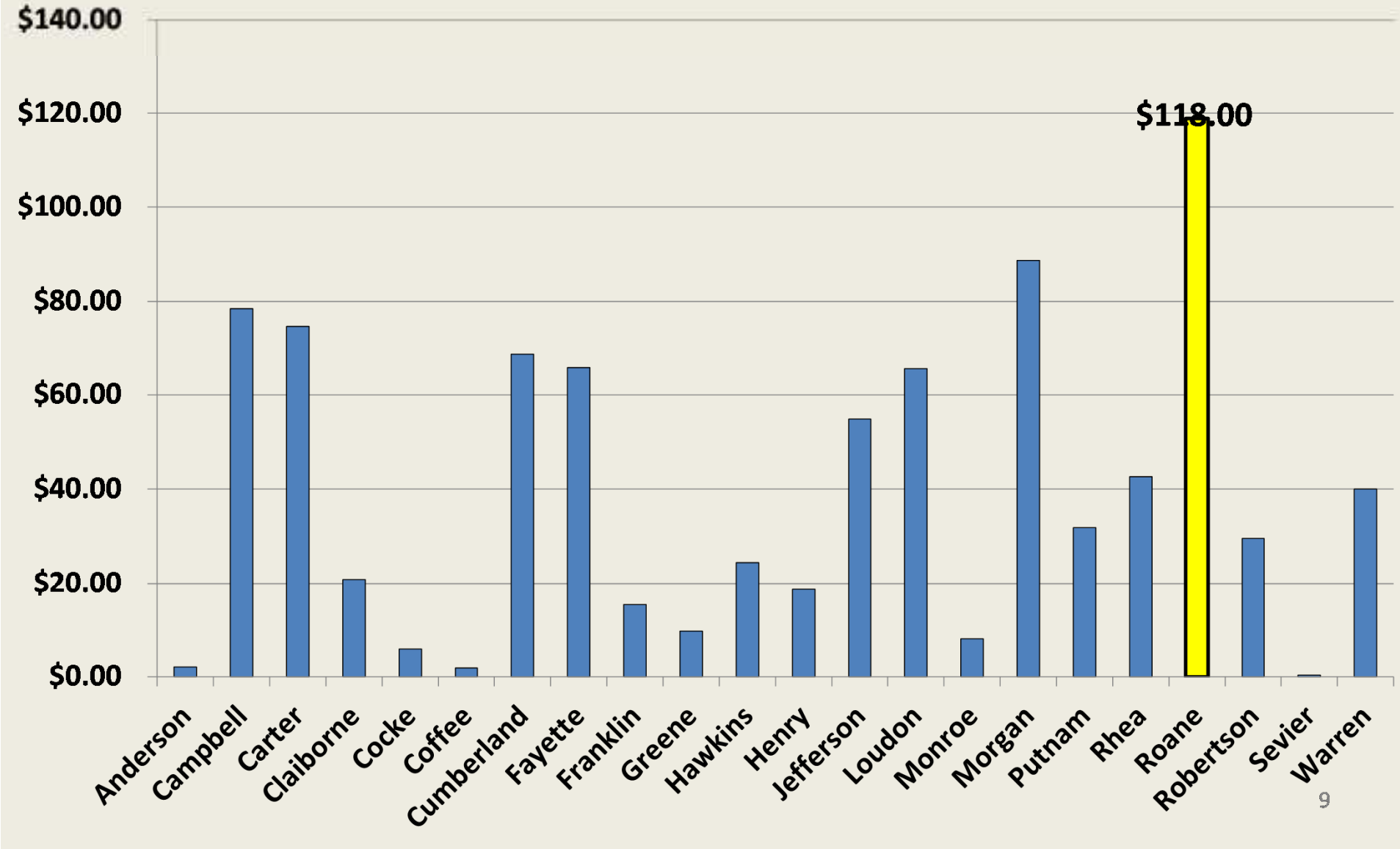
Economic Comparison Between 20 County Solid Waste Programs

County	Population	Recycling Rate (Residential)	Solid Waste (tons)	Solid Waste Expense	Solid Waste Cost (Per Person)	Total Recycled (tons)	Revenue from Recycling	Recycling Revenue (per ton)	Cost Savings
Anderson	75233	13.77%	66,880	$1,400,231	$18.6	10361	$21,706	$2.09	$4.42
Campbell	40512	4.43%	26,349	$2,250,227	$55.5	1793	$140,614	$78.43	$4.80
Carter	57185	1.29%	49,623	$860,288	$15.0	738	$55,000	$74.53	$1.35
Claiborne	32172	2.69%	17,717	$1,510,418	$46.9	865	$18,068	$20.88	$1.37
Cocke	35544	15.72%	37,132	$1,613,572	$45.4	5588	$32,936	$5.89	$5.64
Coffee	53016	24.95%	28,882	$1,409,442	$26.6	13227	$25,000	$1.89	$7.96
Cumberland	56632	10.71%	54,217	$2,528,086	$44.6	6067	$416,079	$68.58	$10.56
Fayette	38513	4.69%	26,224	$895,230	$23.2	1804	$118,750	$65.81	$4.49
Franklin	40917	37.71%	41,909	$1,416,586	$34.6	12973	$200,000	$15.42	$14.40
Greene	69339	7.66%	68,300	$2,054,237	$29.6	5313	$51,356	$9.67	$3.04
Hawkins	56671	1.45%	41,793	$1,409,452	$24.9	820	$20,000	$24.40	$.79
Henry	32352	5.58%	40,779	$596,917	$18.5	1805	$33,600	$18.61	$2.71
Jefferson	51666	7.06%	36,988	$3,107,901	$60.2	3645	$199,901	$54.84	$5.99
Loudon	49237	3.53%	197,850	$680,882	$13.8	1738	$114,000	$65.59	$3.37
Monroe	44882	3.02%	30,920	$2,189,039	$48.8	1357	$11,000	$8.11	$1.15
Morgan	21838	1.74%	11,531	$1,036,826	$47.5	380	$33,712	$88.68	$2.07
Putnam	72958	14.57%	63,239	$3,816,710	$52.3	10628	$338,186	$31.82	$9.01
Rhea	32079	0.22%	27,729	$534,075	$16.6	70	$3,000	$42.69	$.16
Roane	***53838***	***4.45%***	***27,274***	***$1,232,104***	***$22.9***	***2398***	***$284,829***	***$118.79***	***$6.63***
Robertson	67106	3.60%	44,218	$2,210,098	$32.9	2413	$71,243	$29.53	$2.14
Sevier	91446	100.27%	69,884	$2,426,823	$26.5	91712	$33,752	$.37	$30.45
Warren	39927	3.61%	33,612	$1,044,269	$26.2	1441	$57,717	$40.06	$2.53
								$43.33 AVERAGE	

Total Recycling Revenue 2011



Recycling Revenue Per Ton 2011



Performance

Potential Performance Measures (2012 – 2013):

- **Solid Waste**
  - **Household Hazardous Waste Pounds- 4,646 lbs**
  - **E-Waste Tons removed from waste stream – 469 tons**
  - **Percent of roll-off trailers with proper signage and paint- 90%**
- **Recycle Center**
  - **Cost/Person- $22.90**
  - **Cost Savings/Person - $6.63**
- **Convenience Centers**
  - **Percent of County Residents within 5 mile driving distance of a Full Service Collection Point- 100%**
  - **Service (recycling services, hours of operation, interactions with attendees)- 11 Convenience Centers and 1 Recycling Center**
  - **Percent of Center Operators Completing Quarterly Training- 100%**

Best Practices
Plastic Sorting #1 and #2

Contamination rates have to remain under two percent to receive high dollar. Mixed bales are less valuable so it pays to separate plastics.

#1 PETE Plastics- Clear Plastics

These consist of soda and other clear grades such as:

- **Clear and green soft drink bottles**
- **Clear and green liquor bottles**
- **Some cooking oil containers**
- **Some coffee containers**
- **Some small water containers**

Bottles must be clean with caps removed. Approximately 25 cubic yards (16 gaylord boxes) of PET bottles will equal an 800 pound bale of plastics .

Contamination sources include PVC bottles, any other type of plastic, materials deteriorated due to sunlight, dirt and mud, grease and glass, paper, moisture, containers that contained pesticides, herbicides, or other hazardous materials.

Best Practices

Plastic Sorting #1 and #2

#2 HDPE Plastics- Color Plastics

HDPE natural bottles consist of post consumer, blow molded, translucent bottles with necks.

This grade of plastic consists of:

- **Milk containers**
- **Some juice and water containers**

Bottles should be rinsed with caps or closures removed. **Approximately 40 cubic yards (25 gaylord boxes) of HDPE bottles will equal an 800 pound bale of plastics.**

Bale Standards for #1 and #2 Plastics

Bales must be:

- **Clean and dry**
- **Secured with 10 gauge galvanized baling wire**
- ***Stored out of the sunlight and weather***
- **Loaded, shipped, handled and stored maintaining integrity**
- **Dense (at least 10 lbs. per cubic foot)**
- **A standard size**

A typical truck load of plastics will be around 30,000 pounds (15 tons). It is important that the baler can produce bales of 600 lb or greater due to the limited number of bales that can be placed on a tractor trailer.

Best Practices
Corrugated Cardboard
OCC

Corrugated cardboard (OCC) is the single largest source of and most recovered paper grade in the waste stream. Quality control is very important in processing OCC for recycling.

Contamination is also a serious issue with OCC processing. Contaminants are known as outthrows. Outthrows are usually paper of a different type, a small percentage of which may be acceptable.

Baled OCC can be stored inside or outside for an Extended period of time and depending on buyer requirements. Sunlight and rain can overtime degrade OCC bales but it can take several months depending on the time of year.

ACCEPTED OUTTHROWS CARDBOARD

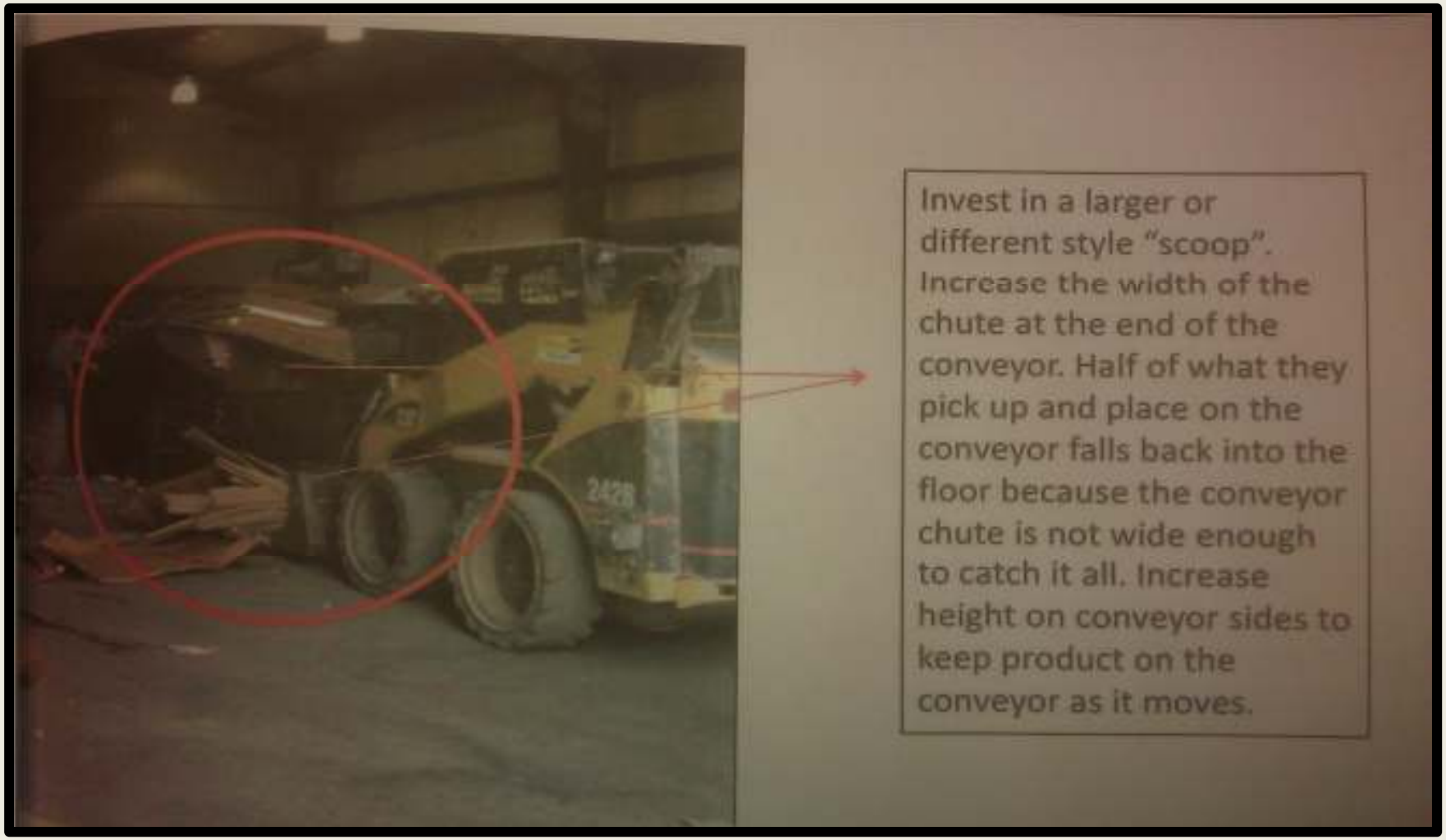
Newspapers are a common outthrow that is acceptable.

Outthrows are limited to 5% contamination.
Prohibitive materials are usually non-paper items such as metals, plastics, glass, food, wood and dirt.
Prohibitive materials limited to 1% contamination.
Paper bags are acceptable in corrugated bales.

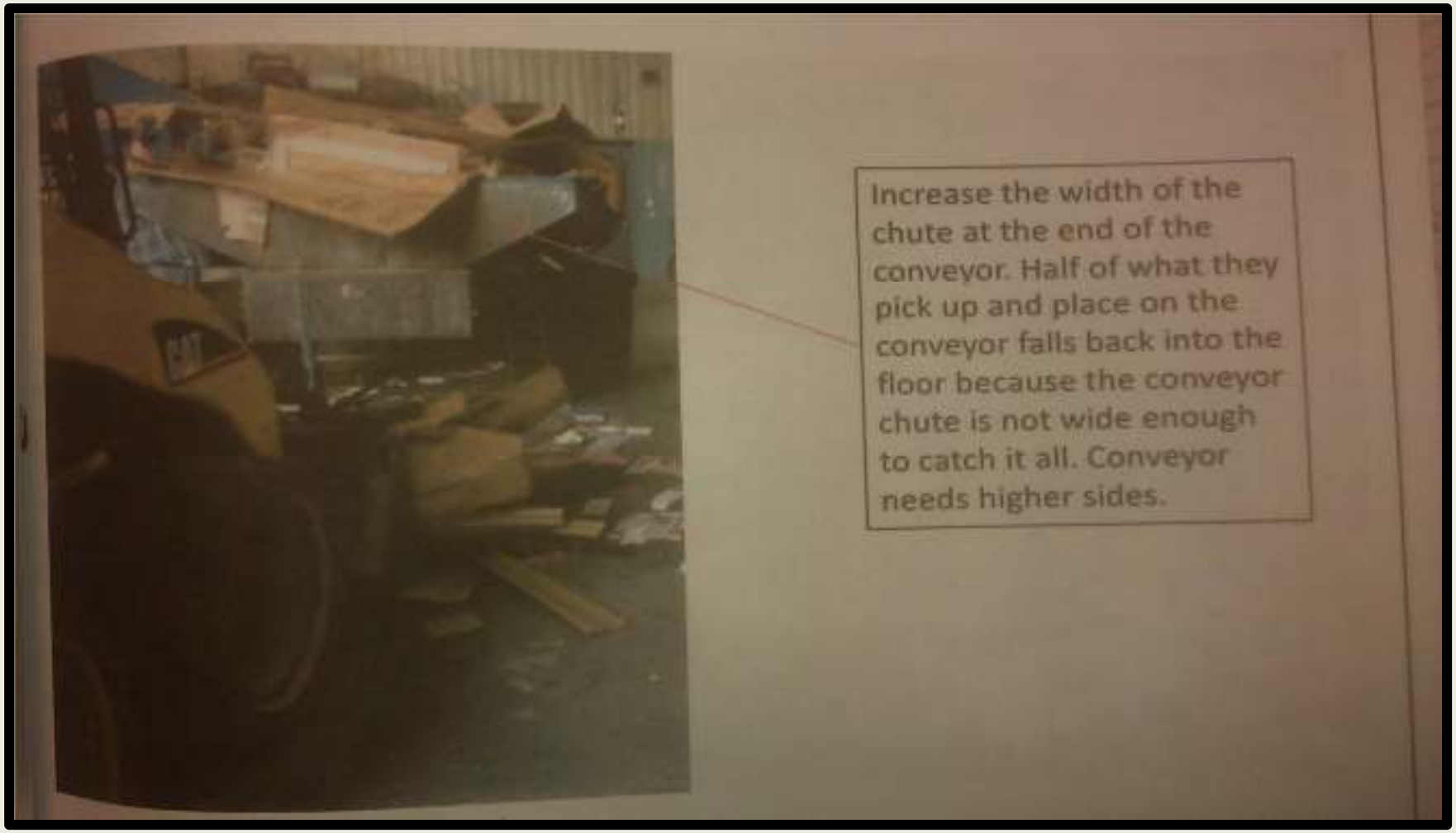
UNACCEPTED OUTTHROWS CARDBOARD

- **Wax/plastic coated cartons**
- **Chipboard/boxboard (cereal and tissue boxes)**
- **Magazines, carrier stock (soda/beer cartons), and feed sacks (wet strength or plastic lined)**

Photos and Diagrams



Photos and Diagrams



Photos and Diagrams

Photos and Diagrams