Waste Sort Training for Tribes

Handbook

September 2020

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Introduction

Understanding the type and amount of waste that is being disposed of in your area is a vitally important topic to enable you to protect the health of your community and environment. The information collected during a waste assessment will uncover opportunities to improve current waste management methods, reduce waste, refine collection processes, reduce costs, and collect metrics to build and improve your solid waste program.

This Waste Sort Training for Tribes Handbook is intended to supplement the Waste Sort Training for Tribes Webinar occurring on September 1 and 2, 2020. Topics addressed during the training include: an overview of solid waste management, an overview of waste assessments, types of waste assessments, waste sort planning and preparation, waste sort field work and data management, utilizing waste sort results, opportunities for collaboration, and Tribal funding and assistance resources. The training also includes presentations from representatives from the Pala Band of Mission Indians and the Prairie Band of Potawatomi Nation to share their waste sort experiences.

This Handbook provides additional information to help you understand the waste sort process and conduct your own waste sort in your community. This training will teach you best practices for conducting a waste sort so that you can make informed decisions to help maximize your tribe's waste management resources related to the collection, transportation, processing, and disposal of waste materials.

Commonly Used Solid Waste Acronyms

AD	Anaerobic Digestion
ASTM	American Society for Testing and Materials
C&D	Construction and Demolition
EPA	Environmental Protection Agency
H&S	Health and Safety
HASP	Healthy and Safety Plan
HDPE	High Density Polyethylene
HHW	Household Hazardous Waste
MSW	Municipal Solid Waste
MRF	Materials Recovery Facility
OCC	Old Corrugated Cardboard
ONP	Old Newsprint
PET	Polyethylene Terephthalate
PP	Polypropylene
PPE	Personal Protective Equipment
TPD	Tons per Day
TPY	Tons per Year

Commonly Used Solid Waste Terms

Anaerobic Digestion (AD): The controlled decomposition of organic materials, such as leaves, grass, and food scraps, by microorganisms. Anaerobic digestion happens in closed spaces where there is no oxygen.

ASTM International: Formerly the American Society for Testing and Materials, ASTM International is a non-profit, membership-based and consensus-driven standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services.

ASTM International D 5231 – 92: The standard test method for determination of the composition of unprocessed municipal solid waste.

Collection: The transfer of solid waste from the point of use and disposal to the point of treatment or landfill. Waste collection also includes the curbside collection of recyclable materials that technically are not waste, as part of a landfill diversion program.

Combustion with Energy Recovery: The conversion of non-recyclable waste materials into usable heat, electricity, or steam through the process of combustion, in which waste materials are heated in a controlled environment to the point of self-igniting.

Composite: A composite material is a combination of two materials with different physical and chemical properties.

Composting: The natural process in which microorganisms break down organic materials, such as leaves, grass, and food scraps, by microorganisms. Composting occurs when oxygen is present. The result of this decomposition process is compost, a crumbly, soil-like material.

Confidence Interval: A confidence interval, in statistics, refers to the probability that a range of values is likely to include the average value of the data set. For example, a 90% confidence interval means that 9 out of 10 times the data set is produced, the data set's average will land within the error range. The top and bottom of the error range is known as the upper and lower confidence interval.

Construction and Demolition (C&D) Debris: Materials resulting from the construction, remodeling, repair, or demolition of buildings, bridges, pavement, and other structures. Typically includes concrete, asphalt, wood, metals, drywall (gypsum

wallboard, sheet rock, or plaster), and roofing materials. Land clearing debris such as stumps, rocks, and dirt may also be included in this category of waste.

Contamination: Recycling contamination is non-recyclable material or garbage that ends up in the recycling system or stream.

Convenience Centers: Community waste and/or recyclables drop-off sites. They typically consist of one or more bins for waste and/or recyclables and are located at spots convenient for residents, such as near major roads or at shopping centers or community centers.

Curbside Collection: Programs in which waste or recyclable materials are collected at the curb, often from special containers, and then taken to various processing facilities.

Disposal: Waste disposal includes removing and destroying or storing damaged, used, or other unwanted products, materials, and substances. In the context of this course, disposal primarily refers to burying material at landfill sites.

Diversion: Waste diversion is the process of diverting waste from landfills or other disposal methods through recycling and source reduction activities.

Drop-off Collection: A method of collecting waste, recyclable, or compostable materials in which the materials are taken by individuals to collection sites, such as convenience centers, where they deposit the materials into designated containers.

End-Use Market: A company or other entity that purchases recycled materials for use in manufacturing new products.

Error Range or Error Bars: In statistics, a numerical or graphic representation, such as a line on a chart, that represents how variable the data set is. An error range indicates the uncertainty or "error" in the data reported and gives a general idea of how precise the data set is.

Fines: Waste materials that are small in size (usually less than 2 inches in size) that are too small to sort or separate either mechanically or manually.

Generator: Any entity that produces solid waste. Generators are usually divided into the following types: residential (single or multi-family households); commercial (offices, retail, and wholesale outlets); institutional (social, educational, or charitable activities); and industrial (industrial processes or manufacturing operations).

Generation Rate: Amount of solid waste produced over a given period of time. For example, a community might produce 1,600 tons of waste per year. For a population of 2,000, that amounts to 4.4 pounds per person per day.

Health and Safety Plan (HASP or H&S Plan): A health and safety plan is a plan that outlines the safety measures and procedures implemented in a workplace. It is also designed in accordance with the legislative requirements covering the roles and responsibilities of the staff and the emergency action plan.

Household Hazardous Waste (HHW): The leftover content of consumer products used in and around the home that contain hazardous components, including certain paints, cleaners, stains and varnishes, car batteries, motor oil, and pesticides. Certain types of household hazardous waste have the potential to cause physical injury to sanitation workers, contaminate septic tanks or wastewater treatment systems if poured down drains or toilets, and present hazards to children and pets if left around the house.

While households do not have to separate household hazardous waste from trash under federal law, some states and localities, including tribes, have special disposal requirements for this waste.

Illegal or unauthorized dumping: The dumping of waste illegally or without permission, either on land or water, instead of using an authorized method such as curbside collection or a regulated landfill.

Incinerator: A furnace for the routine burning of waste materials using controlled flame combustion. Various types of incinerators are used in the process of Combustion with Energy Recovery, but not all incineration facilities are designed to meet the requirements of Combustion with Energy Recovery.

Integrated Solid Waste Management: A solid waste management system composed of the following actions, steps, methods, processes, and facilities: planning, financing, regulation, operation, and management. It also includes reduction of solid waste generation (source reduction), collection, transfer, materials recycling, composting, combustion, and disposal. EPA defines integrated solid waste management as a process for managing solid waste and materials diverted from solid waste through a combination of any of the following four methods of management: source reduction, recycling, combustion, and landfilling.

Landfill: A landfill (informally referred to as a tip, dump, rubbish dump, garbage dump, or dumping ground) is a site for the disposal of waste materials by method of burial. Landfill is the oldest and still most common form of waste disposal in the United States. In the context of this course, landfill refers to a sanitary landfill, which is engineered to contain and prevent leakage of waste materials into surrounding land and groundwater, as well as to contain odors and various air pollutants that may be harmful to the surrounding community.

Material Category: In general, categories contain types of materials that are made of the same base material; for example, paper, plastic glass, or metal.

Material Type: Materials with the same basic attributes within a material category; examples include old corrugated cardboard (OCC), newsprint (ONP), and office paper, and aluminum cans.

Materials Recovery Facility (MRF): A materials recovery facility is a specialized plant that receives, sorts and separates, and prepares recyclable materials for sale to end-use markets.

Medical Waste: All wastes from hospitals, clinics, or other health care facilities that contain or have come into contact with diseased tissues or infectious microorganisms. Can include human blood and blood products, pathological waste, discarded sharps (e.g., needles, lancets, scalpels, broken medical instruments), and contaminated animal waste. Also referred to as "red bag" waste because of the red biohazard bags in which it is discarded.

Municipal Solid Waste (MSW): A specific type of solid waste that primarily consists of trash comprised of various items that consumers throw away, for example, packaging, food, yard trimmings, paper, plastics, metals, glass, furniture, appliances, tires, clothing, etc. Despite the name, MSW is not limited to municipalities and comes from a variety of sources, including residences, businesses, schools, hospitals, etc. By definition, MSW does not include industrial waste (including manufacturing waste), hazardous waste (including medical waste and chemicals), or construction and demolition debris, although these items may still appear in MSW streams on occasion.

Open Burning: The uncontained burning of solid waste in a pit, pile, container, or open dump. Open burning does not comply with federal and local regulatory standards and legal requirements for the disposal of waste and does not qualify as Combustion with Energy Recovery.

Open Dump: An uncovered site used for disposal of waste without environmental controls and that does not comply with federal and local regulatory standards and legal requirements for the disposal of waste.

Organics: Organic waste is any material that is biodegradable and comes from either a plant or an animal.

Personal Protective Equipment (PPE): Personal protective equipment is protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection. The hazards addressed by protective

equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter.

Processing: Processing is the physical treatment of waste by using physical methods, techniques, and technologies for changing the composition and character of the waste.

Records Evaluation: A detailed review of available waste- and recycling-related data, including waste hauling and disposal contracts, records, and receipts. A records evaluation provides insight into an organization's waste generation and removal patterns including purchasing, supply invoices, waste hauling and disposal records, and service contracts.

Recoverable: Recoverable materials are those that can be successful recovered, removed, or extracted from a waste stream and that have economical value or utility for purposes such as reuse, repair, recycling, composting, or conversion to energy.

Recycling: A series of activities that includes collecting recyclable materials that would otherwise be considered waste, sorting by either manual or mechanized methods to separate by material type, and processing these separated material types into raw materials such as fibers and plastic resins that can be used for manufacturing into new products.

Residue: The remaining waste material that is left over after sorting or processing either at a waste or recycling processing facility (the material that either cannot be processed or does not have economical value or utility) or during a waste sort (the material that cannot be sorted into any other defined category).

Reuse: Using a product more than once, either for the same purpose or for a different purpose. Reusing items by repairing them, donating them to charity or community groups, or selling them also reduces waste.

Roll-off Container: A large waste or recyclables container that fits onto a tractor-trailer that can be dropped off and picked up hydraulically.

Sampling Plan: A waste sampling plan outlines where, how, and when samples will be taken during a waste sort in order to produce a data set that both is random and representative of the larger waste stream.

Skewness: In statistics, a measure of how uniform the distribution of the set of values is around its average. A positive or negative skew to a data set can be an indication of the consistency of the data.

Solid Waste: Solid waste is a general term that includes any garbage, refuse, or discarded material resulting from industrial, commercial, mining, and agricultural

operations, and from community activities. Solid waste also includes sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility. Municipal Solid Waste (MSW, see above) is a specific type of Solid Waste.

Sorting Plan: A waste sorting plan outlines how samples will be physically sorted and into what specific material categories and types during a waste sort.

Source Reduction (or Waste Prevention): Refers to any change in the design, manufacture, purchase, or use of materials or products (including packaging) to reduce the amount, quantity, or quality of these materials or products before they become waste. Source reduction can also refer to the reuse of products or materials.

Special Wastes: A non-regulatory term often used by tribes to describe problem wastes typically generated by households that are not disposed in household garbage containers primarily due to their size or because of disposal restrictions. The most common special wastes include tires, furniture, bicycles, appliances and other white goods, and car batteries. Tires and lead-acid car batteries are examples of special wastes that might have disposal restrictions.

Standard Deviation: In statistics, a measure of the amount of variation (the deviation) of a set of values. A low standard deviation means that all the values in a set tend to be close the average value of the set. A high standard deviation means that the values in a set tend to be spread out over a wider range. Note: The unit of measure of the standard deviation is the same as the data set itself, e.g., if the data set is measured in pounds, the standard deviation that results will also be in pounds.

Tare Weight: A tare weight is the weight of an empty vehicle or container. Subtract the tare weight from the weight of the full vehicle or container to determine the weight of only the goods or materials carried or contained.

Transfer: The movement of waste over a specific area by trains, tankers, trucks, barges, or other vehicles.

Transfer Station: A site or facility where waste materials are taken from smaller collection vehicles (or private vehicles) and placed in larger vehicles, including trucks, trailers, railroad cars, or barges for transport. Recycling and some waste processing may also occur at some transfer stations.

Variance: In statistics, variance measures the spread of a data set. A low variance means that the numbers tend to be very close to the average and to each other indicating a more representative data set. A high variance means that the numbers tend to be spread out from the average and from each other, potentially identifying an outlier data point.

Visual Assessment: A visual assessment is a direct observation and evaluation of the physical properties of waste materials that are visible to the naked eye and that can be evaluated directly in the field. A visual assessment can be completed at the point of waste generation, collection, or disposal.

Waste Assessment: A waste assessment is a systematic study of a community's or an area's waste stream. The three main types of waste assessments are: Records Evaluation, Visual Assessment, and Waste Characterization Study ("Waste Sort").

Waste Characterization Study ("Waste Sort"): A waste characterization study or "waste sort" is the process of collecting random and representative samples of a particular waste stream and manually sorting these samples into individual waste components by material type; it is a systematic process used to identify, sort, and analyze material types in a particular waste stream. Data from such a study can be statistically analyzed to understand the detailed composition of the waste stream (the Waste Composition Profile) to help, for example, in planning how to reduce waste, set up recycling programs, and conserve money and resources.

Waste Composition Profile: A waste composition profile depicts the percentage of materials contained in a particular waste stream.

Waste Reduction: Using source reduction, recycling, or composting to prevent or reduce waste generation.

Waste Stream: The total flow of solid waste from generators within an area or community that must be recycled, reused, or disposed.

Yard Trimmings: Leaves, grass, clippings, prunings, and other natural organic matter discarded from yards or gardens. Yard trimmings may also include tree stumps and brush

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Training Agenda

Day 1 Agenda

Timeline	Agenda	Objectives
12:30 – 12:45pm CDT	*Virtual Classroom –* • Speaker Introductions • Overview of training agenda • Overview of the student handbook	• *Introduce and get to know the speakers* • *Get oriented on the format and schedule for the training* • *Understand content and resources available in the student handbook*
12:45 – 1:15pm CDT	*Virtual Classroom –* • Big Picture – Solid Waste Management Overview • Q&A on information presented	• *Frame the topic* • *Understand the value of waste assessments in terms of the big picture*

1:15 – 1:45pm CDT	*Virtual Classroom –*
	• About Waste Assessments:
	  ○ Waste Assessments Overview
	  ○ Types of Waste Assessments
	  ○ Q&A on information presented
		• *Understand the local value of waste assessments and potential applications for waste characterization data*
		• *Outline goals for waste assessments*
		• *Introduce different types of waste assessments, strengths & limitations.*
		• *Review main stages of waste assessments and overview of steps*

1:45 – 1:55pm CDT	*Break (10 minutes)*	

1:55 – 2:35pm CDT	*Virtual Classroom –*
	• Conducting a Waste Sort:
	  ○ Planning for the Sort
	  ○ Q&A on information presented
		• *Detail the steps required to plan for a waste sort, including identifying the need for the study, developing goals and objectives, and designing the study*

2:35 – 3:15pm CDT	*Virtual Classroom –*
	• Conducting a Waste Sort:
	  ○ Field Work
	  ○ Q&A on information presented
		• *Learn how to conduct the field work during the sort, including considering health and safety, team training, sample selection, and sorting materials into respective categories*

3:15 – 3:25pm CDT	*Break (10 minutes)*	

3:25 – 4:05pm CDT	*Virtual Classroom –*
	• Conducting a Waste Sort:
	  ○ Data Collection & Analysis
	  ○ Q&A on information presented
		• *Learn how to collect the data during the sort, including weighing, data recording, and analyzing the data after the sort*

4:05 – 4:20pm CDT	*Virtual Classroom –* • Open Discussion and Q&A	• *Open opportunity to discuss local challenges and opportunities, and how a waste sort can work for your Tribe*
4:20 – 4:30pm CDT	*Virtual Classroom –* • Final Q&A • Wrap-up for the day	• *Discuss observations and lessons learned/additional questions*

Day 2 Agenda

Timeline	**Agenda**	**Objectives**
12:30 – 12:40pm CDT	*Virtual Classroom –* • Speaker Introductions - refresh • Overview of training agenda	• *Refresh of speakers for Day 2* • *Get oriented on the format and schedule for Day 2 of the training*
12:40 – 1:20pm CDT	*Virtual Classroom –* • After the Sort: ○ Utilizing Results ○ Q&A on information presented	• *Discuss how to put the information to work, understanding the types of materials disposed and using the information to inform programs and services that prevent and divert waste, and incorporating the information into an Integrated Waste Management Plan or a grant application*
1:20 – 1:55pm CDT	*Virtual Classroom –* • After the Sort: ○ Opportunities for collaboration ○ Funding & Assistance Resources ○ Q&A on information presented	• *Introduce ideas for how to work with entities within the tribe as well as other entities in the local area to achieve results* • *Introduce resources available to tribes for funding and technical assistance*
1:55 – 2:05pm CDT	*Break (10 minutes)*	
2:05 – 3:05pm CDT	*Virtual Classroom –* • Tribal Speakers: Pala Band of Mission Indians ○ Heidi Brow, Waste Resource Specialist ○ Alexis Wallick, Assistant Tribal Historic Preservation Officer	• *Discuss the Pala Band of Mission Indians' experience with conducting waste assessments* • *Explain how the Pala Band of Mission Indians analyzes the data and uses it to inform program activities and secure funding*
3:05 – 3:15pm CDT	*Break (10 minutes)*	
3:15 – 4:15pm CDT	*Virtual Classroom –*	• *Discuss the Prairie Band of Potawatomi Nation's experience with conducting waste assessments*

	• Tribal Speaker: Prairie Band of Potawatomi Nation ○ Virginia LeClere, Environmental Director	• *Explain how the data collected has been put to use* • *Discuss the Prairie Band of Potawatomi Nation's experience with collaborating with others and getting tribal department support for these efforts*
4:15 – 4:30pm CDT	*Virtual Classroom –* • Final Discussion and Q&A • Wrap-up & evaluation • Next Steps and Additional Resources	• *Discuss observations and lessons learned/additional questions*

Course Evaluation

Course Evaluation
Waste Sort Training
September 1 & 2, 2020

Part 1

	Excellent	Good	Fair	Poor
Chapter 1: Solid Waste Management Overview				
Chapter 2: Waste Assessment Overview				
Chapter 3: Types of Waste Assessments				
Chapter 4: Planning for the Waste Sort				
Chapter 5: Field Work During the Waste Sort				
Chapter 6: Collecting the Data from the Sort				
Chapter 7: Utilizing Results				
Chapter 8: Opportunities for Collaboration				
Chapter 9: Funding and Assistance Resources				
Chapter 10: Pala Band of Mission Indians' Waste Sort				
Chapter 11: Prairie Band of Potawatomi Nation's Waste Sort				

Part 2

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. This training provided me with the tools and information needed to plan and conduct a waste sort for my community					
2. I know how to organize and conduct a waste sort in a safe and effective manner					

Part 2 Continued

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
3. I understand how to evaluate and analyze the data collected during a waste sort					
4. I understand the value of and uses for the data and information gained from doing a waste sort					
5. What I learned today will help me improve my Tribe's solid waste management program					

Chapter 1

Solid Waste Management Overview

Chapter 1

Solid waste management affects all aspects of tribal life including public health, environmental quality, economic development, tribal culture, and community pride. The types of tribal solid waste management programs can be varied and diverse, ranging from simple, one-step disposal programs to complex management programs that involve recycling, composting, and disposal. Geography, demographics, financial situation, and culture each influence how a Tribe develops, implements, funds, and enforces their solid waste program.

Solid waste is a general term that includes any garbage, refuse, or discarded material resulting from industrial, commercial, mining, and agricultural operations, and from community activities. Chapter 1 focuses on providing foundational knowledge about municipal solid waste (MSW), a specific type of solid waste. Despite the name, MSW is not limited to municipalities and comes from a variety of sources, including residences, businesses, schools, hospitals, etc.

As the amount of waste generated by communities is expected to increase over time, creating a strong and resilient tribal solid waste management program will become critical to protecting and conserving the tribe's natural, cultural, and economic resources.

Learning Objectives

1. *An explanation of solid waste*
2. *Solid waste management basics: collection, transfer and processing, and treatment and disposal*
3. *Solid waste categories by material type*
4. *Environmental impacts of solid waste management*

What is Solid Waste?

- **"Solid Waste:"**
  - Any **garbage or refuse**
  - **Sludge** from a wastewater treatment plant, water supply treatment plant, or air pollution control facility
  - **Other discarded material**, resulting from industrial, commercial, mining, and agricultural operations, and from community activities

Nearly everything we do leaves behind some kind of waste.

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Notes:

What is *Municipal* Solid Waste?

- Throughout this training, when we refer to solid waste, we are specifically talking about **Municipal Solid Waste (MSW)**
- **Not all "solid waste" is *Municipal* Solid Waste, and MSW is not specific to municipalities**
- **What is MSW?**
  - Trash comprised of various items consumers throw away
  - Packaging, food, yard trimmings, paper, plastics, metals, glass, furniture, appliances, tires, clothing, shoes… and more!

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Notes:

What is *Municipal* Solid Waste?

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Notes:

What is *Municipal* Solid Waste?

- **Where does MSW come from?**
  - Residences
  - Businesses
  - Institutions like schools and hospitals
  - Wide variety of sources!
- **What is <u>NOT</u> MSW?**
  - **Not** industrial waste (including manufacturing waste)
  - **Not** hazardous waste (including medical waste, chemicals, etc.)
  - **Not** construction and demolition waste

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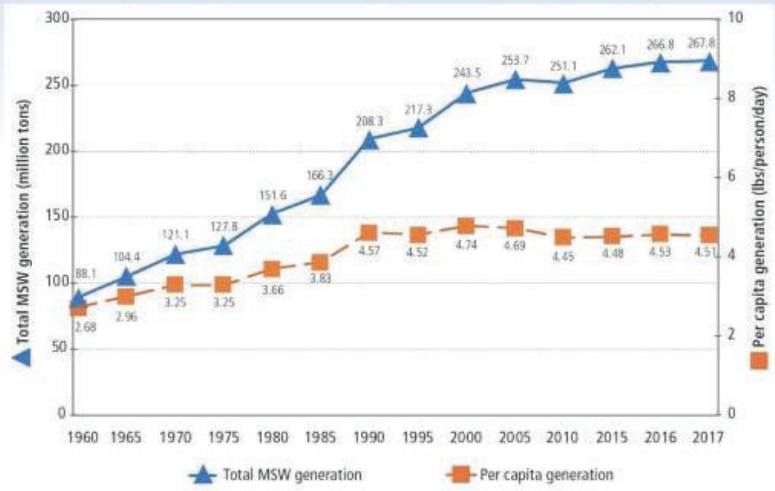
Notes:

MSW Generation: 1960 to 2017



Note: 2017 is the most recent calendar year for which data is available.

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Notes:

Solid Waste Management Basics

1. Collection

- Picking up materials at the generation source
  - Curbside for many residences
  - From dumpsters for apartments, commercial buildings, and institutions
- Picking up materials at designated location
  - Centralized "drop-off" or convenience center where area residents can dispose certain types of materials

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Notes:

Solid Waste Management Basics

2. Transfer and processing

- Materials may be accumulated at centralized facilities where they may be sorted or otherwise manipulated to prepare them for final treatment or disposal

3. Diversion and disposal

- **Diversion:** includes methods like recycling, composting, and using the waste for energy
- **Disposal:** primarily landfilling

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Notes:

Solid Waste Management Basics

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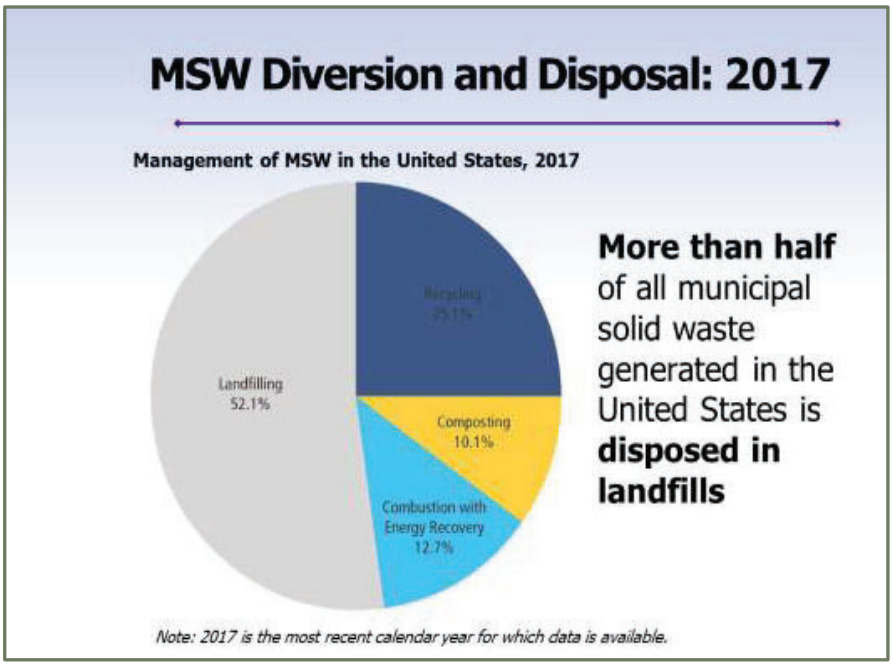
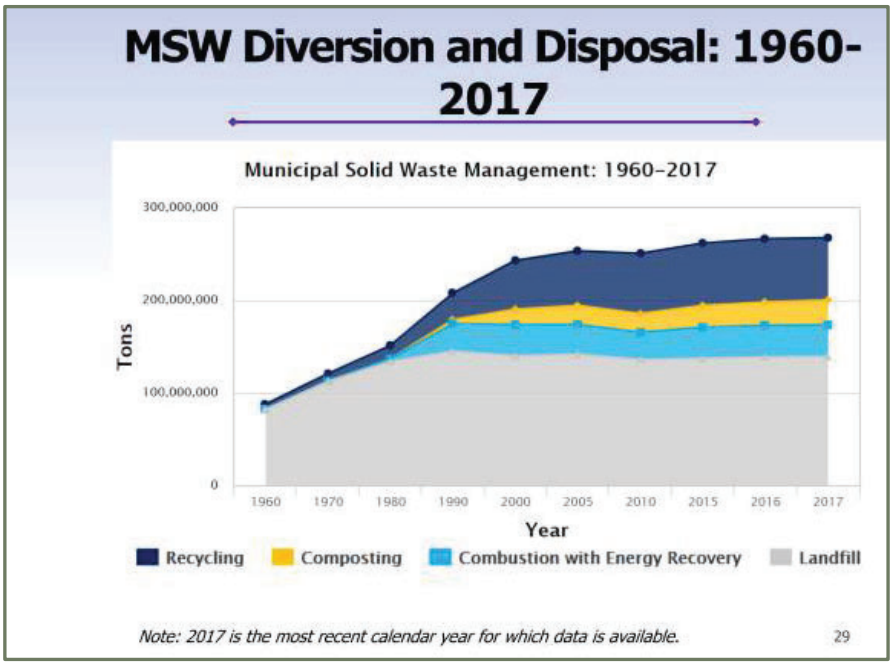
Notes:


MSW Diversion and Disposal: 2017
Management of MSW in the United States, 2017
Landfilling 52.1%
Composting 10.1%
Combustion with Energy Recovery 12.7%
More than half of all municipal solid waste generated in the United States is disposed in landfills
Note: 2017 is the most recent calendar year for which data is available.

Notes:


MSW Diversion and Disposal: 1960-2017
Municipal Solid Waste Management: 1960–2017
300,000,000
200,000,000
100,000,000
0
Tons
1960
1970
1980
1990
2000
2005
2010
2015
2016
2017
Year
Recycling
Composting
Combustion with Energy Recovery
Landfill
Note: 2017 is the most recent calendar year for which data is available.
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Notes:

Solid Waste Material Categories

- Waste can be categorized based on material type:
  - plastic
  - paper
  - glass
  - metal
  - food
  - yard debris
  - textiles

Each tribe generates a unique waste stream, depending on its size, geographic location, and activities

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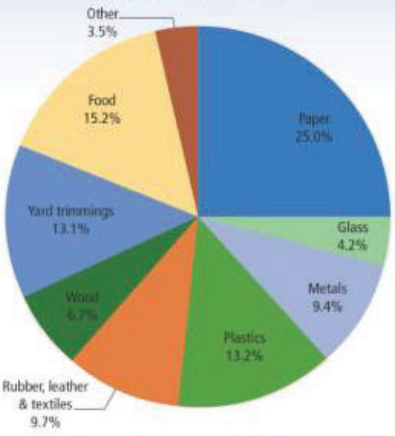
Notes:

2017 Total MSW Generation in the United States

Total MSW Generation by Material, 2017
267.8 Million Tons



Note: 2017 is the most recent calendar year for which data is available.

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Notes:

EPA Waste Management Hierarchy

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Notes:

Environmental Benefits of Waste Management

The waste management hierarchy has several environmental benefits:

- **Conserve land** that would otherwise be needed for landfills
- **Protect land and soil quality** that could otherwise be at risk of illegal dumping
  - Ensuring programs and services address the community's needs and are accessible to residents helps alleviate illegal dumping issues

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Notes:

Environmental Benefits of Waste Management

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Notes:

Environmental Benefits of Waste Management

The waste management hierarchy has several environmental benefits (cont.):

- **Protect air quality** by reducing harmful gases from decomposition
- **Protect surface and ground water** by reducing leaching pollutants from landfills and illegal dumping to surface and ground water

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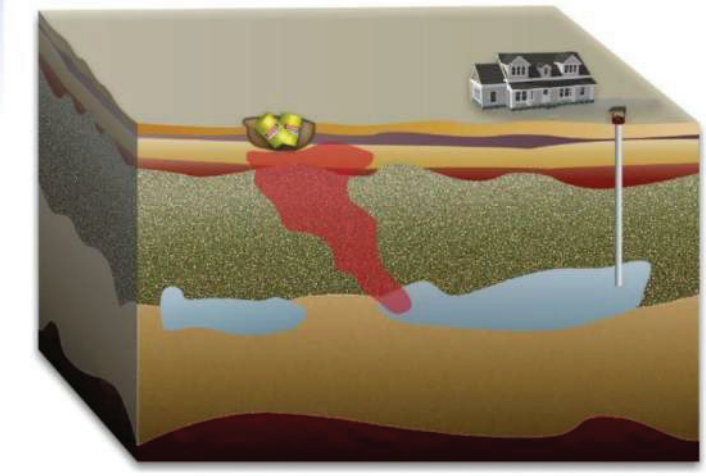
Notes:

Environmental Benefits of Waste Management



Notes:

Environmental Benefits of Waste Management

The waste management hierarchy has several environmental benefits (cont.):

- **Conserve our resources** associated with extracting materials, manufacturing, transporting, using, and managing the end-of-life of products and materials
- **Protect our communities**
  - Environmental issues disproportionately affect minority and lower income communities

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Notes:

Chapter 1 Review

1. **Solid waste** is: a general term that includes any garbage, refuse, or discarded material resulting from industrial, commercial, mining, and agricultural operations, and from community activities; includes sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility.
2. **Municipal solid** waste is: A specific type of solid waste that primarily consists of trash comprised of various items that consumers throw away, e.g., packaging, food, paper, plastics, furniture, appliances, tires, clothing, etc. MSW is not limited to municipalities and comes from a variety of sources, including residences, businesses, schools, hospitals, etc. MSW does not include industrial waste, hazardous waste, or construction and demolition debris, although these items may still appear in MSW streams on occasion.

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Notes:

Chapter 1 Review

3. Solid waste management is composed of 3 categories**: collection, transfer and processing, and diversion or disposal**
4. **Waste generation has been trending upwards** over time in almost all communities
5. The **majority of waste is disposed in landfills**. However, great diversion options (ex. recycling and composting) can be utilized!
6. A key component of a strong tribal solid waste management program is setting up systems, programs, and services that reflect your tribe's environmental and economic needs
7. Solid waste management touches all aspects of life - public health, environmental quality, economic development and prosperity, community pride, culture and land stewardship.

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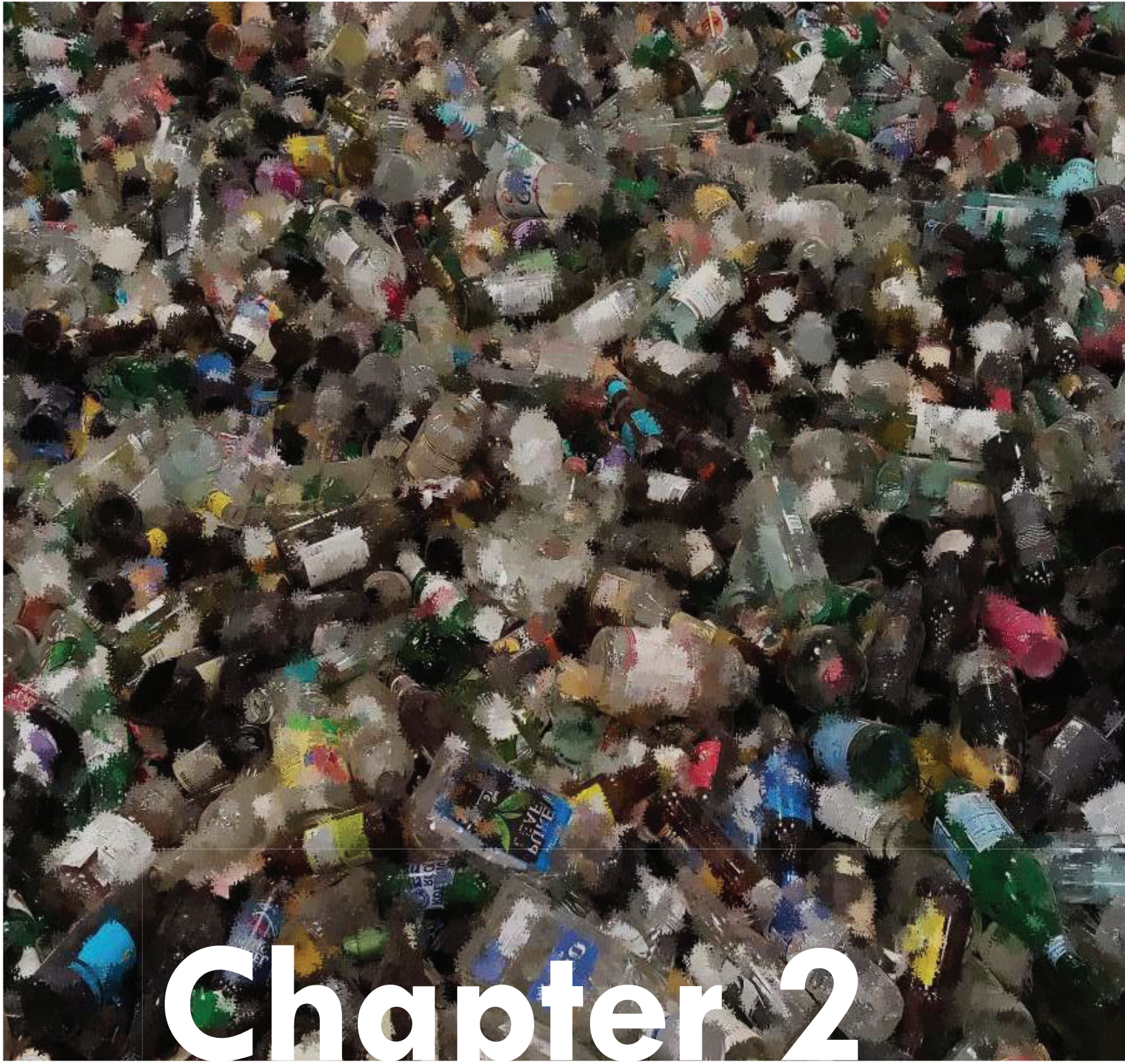
Notes:



Chapter 2

Waste Assessment Overview

Chapter 2

A waste assessment is a systematic study of a community's or an area's waste stream. The primary purpose of a waste assessment is to establish a baseline of what is being disposed in your community or area. Conducting a waste assessment can identify the sources, quantities, and types of waste generated in your community.

The three main types of waste assessments are: records evaluation, visual assessment, and waste characterization study or "waste sort"; a waste sort is the type of assessment that this training focuses on. An assessment can inform waste planning decisions, help you understand recycling contamination or recycling program potential, identify program needs, and make a justifiable case for funding and resources.

Learning Objectives

1. *Waste assessment basics*
2. *Understand the importance of waste assessments*

What is a Waste Assessment?

Waste assessment: a systematic study of a community's or area's waste stream.

Depending on the type of assessment, it can:

- Identify **sources** of waste generation
- Identify **quantity** of waste generated (volume and/or weight)
- Identify **types** of waste generated (by material)

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Notes:

What is a Waste Assessment?

The primary purpose of a waste assessment is to **establish a baseline of what is being disposed in your community or area.**

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Notes:

Assessing Tribal Waste Materials

- Establish a waste generation baseline
- Identify potential waste management methods
- Prioritize programs and services to reduce and better manage waste
- Measure the effectiveness of waste management programs, services, and methods

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Notes:

Assessing Tribal Waste Materials

A waste management program can address both the **environmental** and **economic** needs of your tribe

Examples of waste management methods:

- Large amount of organics → set up a composting program
- Large amount of usable clothing → implement a donation program
- Large amount of fixable appliances → establish a repair education program

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Notes:

Assessing Tribal Waste Materials

- Large amount of fixable appliances → establish a repair education program

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Notes:

Why Do a Waste Assessment?

A waste assessment can also help:

- Assess current waste management **practices and effectiveness**
- Evaluate the **success of programs and services that divert materials from disposal** into processes like recycling, composting, etc. ("diversion")
- Identify **new waste diversion opportunities or necessary improvements**

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Notes:

Why Do a Waste Assessment?

- Inform **waste planning decisions**, including areas where improvements are most needed or would be most impactful/effective

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Notes:

Why Do a Waste Assessment?

- Understand **recycling contamination or recycling program potential**

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Notes:

Why Do a Waste Assessment?

- Assess the **suitability of the waste stream** for a particular diversion method

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Notes:

Why Do a Waste Assessment?

Programs and services can be expensive:

- Cost to **build facilities and purchase equipment**
- Cost to **operate and maintain facilities and equipment**
- Cost to conduct **community education and outreach efforts** (ongoing)

In many cases securing outside funding relies on an accurate waste assessment

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Notes:

Use Waste Assessments to Secure Funding

A waste assessment will lay the groundwork to **communicate your Tribe's solid waste management needs** and make a justifiable case for funding and resources – both from within the Tribe and from outside sources.

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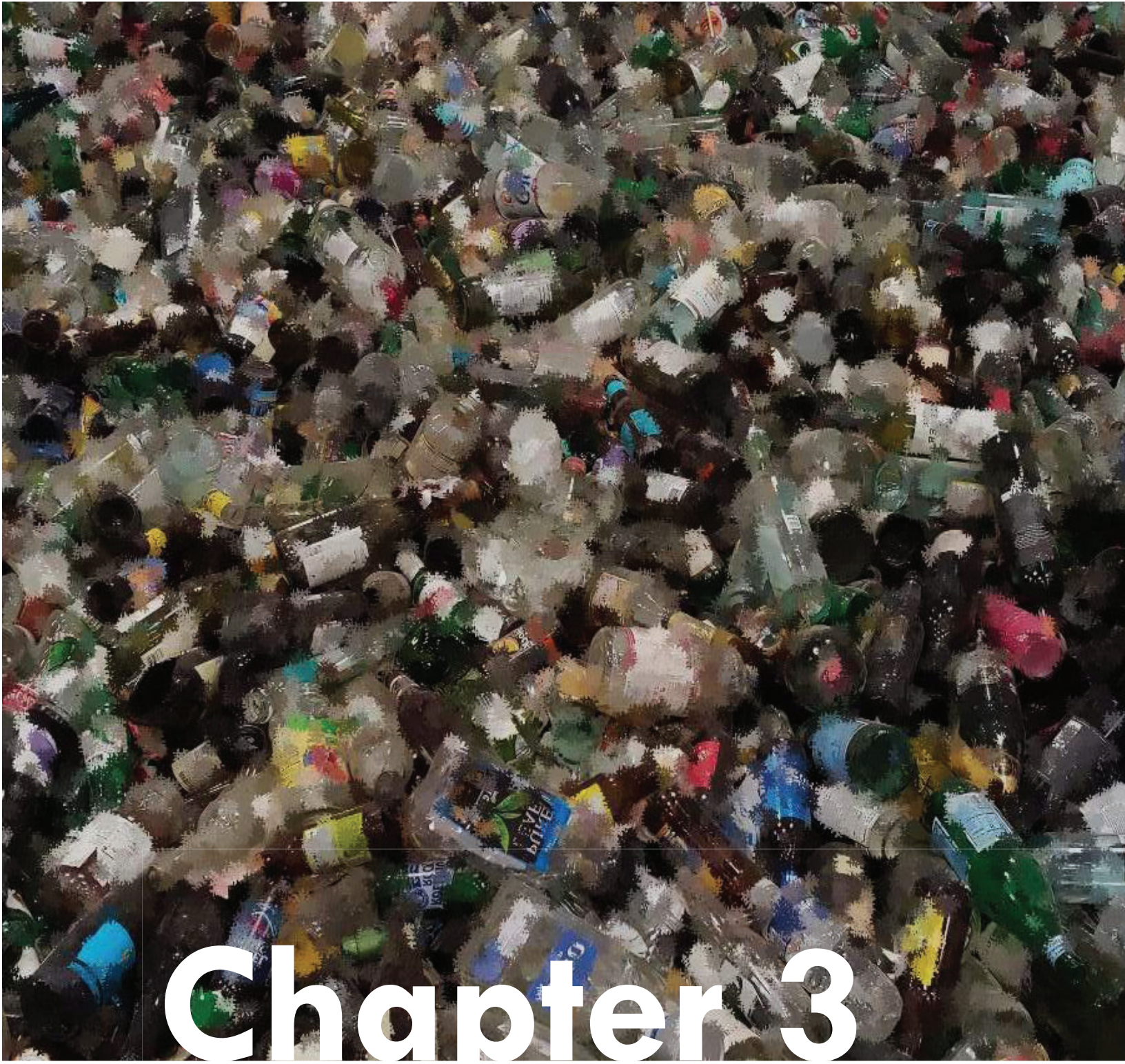
Notes:

Chapter 2 Review

1. A **waste assessment** is defined as: a systematic study of a community's or area's waste stream
2. The primary purpose of a waste assessment is to establish a baseline of what is being disposed in your community or area
3. Conducting a waste assessment can identify the sources, quantities, and types of waste generated in your community
4. An assessment can also inform waste planning decisions, help you understand recycling contamination or recycling program potential, identify program needs, and make a justifiable case for funding and resources

56

Notes:



Chapter 3

Types of Waste Assessments

Chapter 3

A solid waste assessment is the backbone to a successful tribal solid waste program. Characterizing tribal waste will help solid waste decision makers evaluate current management practices and services and identify new waste diversion opportunities or necessary improvements. In Chapter 2, the three main types of waste assessments were introduced: records evaluation, visual assessment, and waste characterization study.

Chapter 3 describes the process of conducting the three types of waste assessments in detail in detail. Although there are strengths and limitations to each type of assessment, a waste sort is recommended for any tribe evaluating its solid waste program because it will enable your tribe to identify specific types of waste generated at different locations. A waste sort is the process of collecting random and representative samples of the waste stream and manually sorting these samples into individual waste components by material type. The three major phases of waste sorts are planning, field work, and data analysis. The greatest benefit of a waste sort is that it produces reliable and accurate results that can be used to make informed decisions for solid waste programs and services.

Learning Objectives

1. Understand types of waste assessments:

- *Records evaluation*
- *Visual assessments*
- *Waste sort*

2. Introduction to the waste sort process

Types of Waste Assessments

Three primary ways to conduct a comprehensive assessment of your waste stream:

- Records Evaluation
- Visual Assessment
- **Waste Characterization Study,** commonly known as a **"Waste Sort"**

Focus of this training

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Notes:

Records Evaluation

Defined as a **detailed review of available waste- and recycling-related records and data**, including:

- Waste hauling and disposal records and contracts
- Tipping fee receipts
- Contracts with recycling facilities and earned revenues from recycling

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Notes:

Records Evaluation

Strengths:

- Provides data on the weight or volume of waste / recyclables on a regular basis
- Tracks waste from the point of origin
- Identifies the most expensive or valuable components of an organization's waste
- Documents financial benefits of waste minimization / recycling / diversion
- Requires less time and effort than a waste sort

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Notes:

Records Evaluation

Limitations:

- Might not provide quantitative data about specific waste material components or types
- Might require substantial effort upfront to gather the records
- Does not provide data on how or why wastes are generated

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Notes:

Visual Assessment

Defined as a **physical, visual observation** of your waste materials will enable you to:

- Observe the quality of the waste, including types and relative amounts of waste
- Identify waste-producing activities and sources
- Assess existing space and equipment for collection of recyclables and other material types or diversion streams

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Notes:

Visual Assessment

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Notes:

Visual Assessment

Strengths:

- Requires less time and effort than waste sorts
- First-hand examination of facility operations
- Flexibility to observe and assess point of generation, collection, and disposal
- Provides qualitative information about major waste components and waste-generating processes
- Reveals waste reduction opportunities

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Notes:

Visual Assessment

Limitations:

- Relies on estimates of waste generation
- Needs to be repeated throughout the year to improve the reliability of the estimates
- Might not identify all wastes generated

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Notes:

Visual Assessment

Considerations for Planning and Conducting a Visual Assessment:

- Identify areas to be evaluated
- Assess how procedures or operations affect waste generation
- Evaluate which activities generate the most waste
- Identify any seasonal or event-related wastes
- Schedule observations just before pickups

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Notes:

Waste Sort

- The process of collecting **random and representative samples** of the waste stream and **manually sorting** these samples into **individual waste components by material type**

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Notes:

Waste Sort

A **waste sort** will enable you to:

- **Statistically analyze** data from the sort to understand the **detailed composition** of the waste stream
- Identify specific types of waste by quantity of the overall waste stream
- Target specific waste generators (e.g. residences, businesses, institutions)

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Notes:

Waste Sort

Strengths:

- Allows flexibility to target generator types or even individual generators
- Provides very detailed information on quantity of waste generated
- Identifies specific waste components and material types
- Produces **reliable and accurate** results that can be used to make informed decisions for programs and services

The most important strength of a waste sort!

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Notes:

Waste Sort

Limitations:

- Requires more time and resources than records or visual assessment
- May not be representative if only performed once

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Notes:

Waste Sort Process

This training is based on the main standard procedure in the United States: **ASTM International: D 5231 – 92 (Reapproved 2003)** "Standard Test Method for the Determination of the Composition of Unprocessed Municipal Solid Waste"

ASTM International:

- Formerly American Society for Testing and Materials
- A **non-profit, membership-based and consensus-driven standards organization**
- **Develops and publishes voluntary consensus technical standards** for a wide range of materials, products, systems, and services.

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Notes:

Waste Sort Process

1. **Planning**
   - Identify study need, goals and objectives
   - Design the study and plan for the logistics, staffing, health and safety plan, available resources and necessary supplies
2. **Field work**
   - Crew health and safety training
   - Waste sampling and sorting
3. **Data recording and analysis**
   - Data collection, analysis, and utilization

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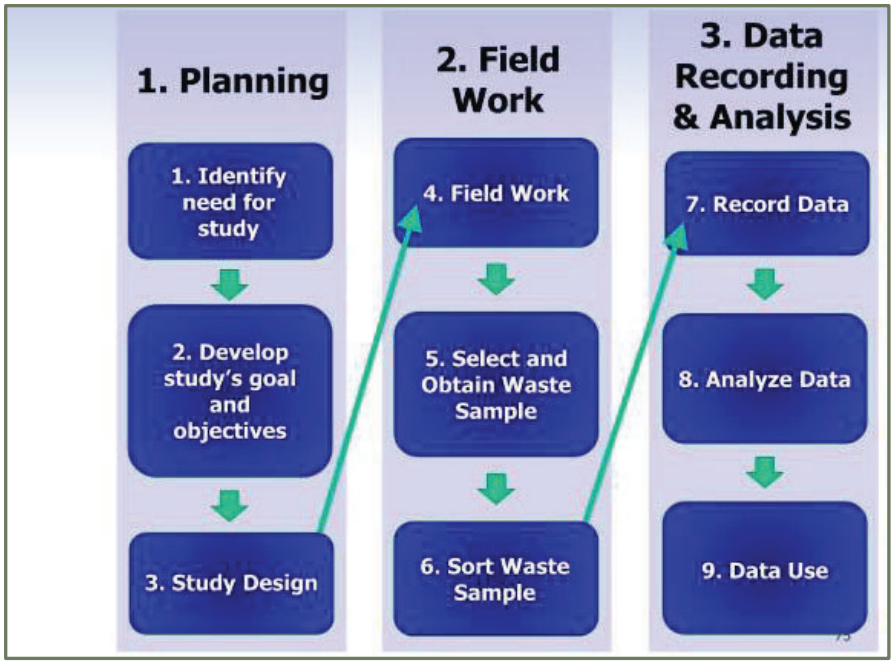
Notes:



Notes:

Chapter 3 Review

1. The 3 methods for waste assessment include: records evaluations, visual assessments, waste sorts

2. A **records evaluation** requires less time and effort than a waste sort but not provide quantitative data about specific waste material components or types

3. A **visual assessment** allows the flexibility to observe and assess point of generation, collection, and disposal but relies on estimates of waste generation

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Notes:

Chapter 3 Review

4. A **waste sort** is the process of collecting random and representative samples of the waste stream and manually sorting these samples into individual waste components by material type

5. A **waste sort** will enable you to identify specific types of waste generated at different locations

6. 3 major phases of waste sorts: **planning, field work, data analysis**

7. Biggest benefit of a waste sort is that it **produces reliable and accurate results that can be used to make informed decisions for programs and services**

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Notes:

Chapter 3 Supplemental Materials

EPA MSW Characterization Methodology

**Please contact EPA for the most current data tables and for more information.*

INTRODUCTION

This fact sheet and these data tables are the most recent in a series of reports and data tables sponsored by the U.S. Environmental Protection Agency to characterize municipal solid waste (MSW) in the United States. Together with the previous reports, this fact sheet and data tables provide a historical database for a 46-year characterization (by weight) of the materials and products in MSW. For brevity, the fact sheet and data tables are both implied when data tables are referred to in this methodology.

Management of the nation's municipal solid waste (MSW) continues to be a high priority for communities in the 21st century. The concept of integrated solid waste management– source reduction of wastes before they enter the waste stream, recovery of generated wastes for recycling (including composting), and environmentally sound disposal through combustion facilities and landfills that meet current standards– s being used by communities as they plan for the future.

This methods description provides background on integrated waste management and the data tables, followed by a brief overview of the methodology. Next is a section on the variety of uses for the information in these data tables. Then, more detail on the methodology is provided.

BACKGROUND

The Solid Waste Management Hierarchy

EPA's 1989 Agenda for Action endorsed the concept of integrated waste management, by which municipal solid waste is reduced or managed through several different practices, which can be tailored to fit a particular community's needs. The components of the hierarchy are:

- Source reduction (or waste prevention), including reuse of products and on-site (or backyard) composting of yard trimmings.
- Recycling, including off-site (or community) composting.
- Combustion with energy recovery.
- Disposal through landfilling or combustion without energy recovery.

As done in previous versions of this report, combustion with energy recovery is shown as discards in the tables and figures.

Overview of the Methodology

Readers should note that this report characterizes the municipal solid waste stream of *the nation as a whole*. Data in this report can be used at the national level. It can also be used to

address state, regional, and local situations, where more detailed data are not available or would be too expensive to gather. More detail on uses for this information in this report for both national and local uses is provided later in this chapter.

At the state or local level, recycling rates often are developed by counting and weighing all the recyclables collected, and then aggregating these data to yield a state or local recycling rate. At the national level, we use instead a *materials flow methodology*, which relies heavily on a mass balance approach. Using data gathered from industry associations, key businesses, and similar industry sources, and supported by government data from sources such as the Department of Commerce and the U.S. Census Bureau, we estimate tons of materials and products generated, recycled, or discarded. Other sources of data, such as waste characterizations and surveys performed by governments, industry, or the press, supplement these data.

To estimate MSW generation, production data are adjusted by imports and exports from the United States, where necessary. Allowances are made for the average lifespans of different products. Information on amounts of disposed MSW managed by combustion comes from industry sources as well. MSW not managed by recycling (including composting) or combustion is assumed to be landfilled.

In any estimation of MSW generation, it is important to define what is and is not included in municipal solid waste. EPA includes those materials that historically have been handled in the municipal solid waste stream–those materials from municipal sources, sent to municipal landfills. In this report, MSW includes wastes such as product packaging, newspapers, office and classroom papers, bottles and cans, boxes, wood pallets, food scraps, grass clippings, clothing, furniture, appliances, automobile tires, consumer electronics, and batteries.

A common error in using this report is to assume that *all* nonhazardous wastes are included. As shown later in this methods description, municipal solid waste as defined here does *not* include construction and demolition debris, biosolids (sewage sludges), industrial process wastes, or a number of other wastes that, in some cases, may go to a municipal waste landfill.

These materials, over time, have tended to be handled separately and are not included in the totals in these data tables. EPA has addressed several of these materials separately, for instance, in *Biosolids Generation, Use, and Disposal in the United States*, EPA530-R-99-009, September 1999, and *Characterization of Building-Related Construction and Demolition Debris in the United States*, EPA530-R-98-010, May 1998. Recycling (including composting) is encouraged for these materials as well.

In addition, the source of municipal solid waste is important. EPA's figures include municipal solid waste from homes, institutions such as schools and prisons, commercial sources such as restaurants and small businesses, and occasional industrial sources. MSW does not include wastes of other types or from other sources, including automobile bodies, municipal sludges, combustion ash, and industrial process wastes that might also be disposed in municipal waste landfills or combustion units.

HOW THESE DATA TABLES CAN BE USED

Nationwide. The data in this tables provide a nationwide picture of municipal solid waste generation and management. The historical perspective is particularly useful in establishing trends and highlighting the changes that have occurred over the years, both in types of wastes generated and in the ways they are managed. This perspective on MSW and its management is useful in

assessing national solid waste management needs and policy. The consistency in methodology and scope aids in the use of the data tables for reporting over time. The data tables are, however, of equal or greater value as a solid waste management planning tool for state and local governments and private firms.

Local or state level. At the local or state level, the data in these data tables can be used to develop approximate (but quick) estimates of MSW generation in a defined area. That is, the data on generation of MSW per person nationally may be used to estimate generation in a city or other local area based on the population in that area. This can be of value when a "ballpark" estimate of MSW generation in an area is needed. For example, communities may use such an estimate to determine the potential viability of regional versus single community solid waste management facilities. This information can help define solid waste management planning areas and the planning needed in those areas. However, for communities making decisions where knowledge of the amount and composition of MSW is crucial, (e.g., where a solid waste management facility is being sited), local estimates of the waste stream should be made.

Another useful feature of these data tables for local planning is the information provided on MSW trends. Changes over time in total MSW generation and the mix of MSW materials can affect the need for and use of various waste management alternatives. Observing trends in MSW generation can help in planning an integrated waste management system that includes facilities sized and designed for years of service.

While the national average data are useful as a checkpoint against local MSW characterization data, any differences between local and national data should be examined carefully. There are many regional variations that require each community to examine its own waste management needs. Such factors as local and regional availability of suitable landfill space, proximity of markets for recovered materials, population density, commercial and industrial activity, and climatic and groundwater variations all may motivate each community to make its own plans.

Specific reasons for regional differences may include:

- Variations in climate and local waste management practices, which greatly influence generation of yard trimmings. For instance, yard trimmings exhibit strong seasonal variations in most regions of the country. Also, the level of backyard composting in a region will affect generation of yard trimmings.

- Differences in the scope of waste streams. That is, a local landfill may be receiving construction and demolition wastes in addition to MSW, but these data tables address MSW only.

- Variance in the per capita generation of some products, such as newspapers and telephone directories, depending upon the average size of the publications. Typically, rural areas will generate less of these products on a per person basis than urban areas.

- Level of commercial activity in a community. This will influence the generation rate of some products, such as office paper, corrugated boxes, wood pallets, and food scraps from restaurants.

- Variations in economic activity, which affect waste generation in both the residential

and the commercial sectors.

- Local and state regulations and practices. Deposit laws, bans on landfilling of specific products, and variable rate pricing for waste collection are examples of practices that can influence a local waste stream.

While caution should be used in applying the data in these tables, for some areas, the national breakdown of MSW by material may be the only such data available for use in comparing and planning waste management alternatives. Planning a curbside recycling program, for example, requires an estimate of household recyclables that may be recovered. If resources are not available to adequately estimate these materials by other means, local planners may turn to the national data. This is useful in areas that may have typical MSW generation or in areas where appropriate adjustments in the data can be made to account for local conditions.

In summary, the data in this report can be used in local planning to:

- Develop approximate estimates of total MSW generation in an area.
- Check locally developed MSW data for accuracy and consistency.
- Account for trends in total MSW generation and the generation of individual components.
- Help set goals and measure progress in source reduction and recycling (including composting).

CHARACTERIZATION OF MUNICIPAL SOLID WASTE: IN PERSPECTIVE

The Two Methodologies for Characterizing MSW: Site-Specific Versus Materials Flow

There are two basic approaches to estimating quantities of municipal solid waste at the local, state, or national levels—site-specific and materials flow. These data tables are based on the materials flow approach.

Site-specific studies. In the first methodology, which is site-specific, sampling, sorting, and weighing the individual components of the waste stream could be used. This methodology is useful in defining a local waste stream, especially if large numbers of samples are taken over several seasons. Results of sampling also increase the body of knowledge about variations due to climatic and seasonal changes, population density, regional differences, and the like. In addition, quantities of MSW components such as food scraps and yard trimmings can only be estimated through sampling and weighing studies.

A disadvantage of sampling studies based on a limited number of samples is that they may be skewed and misleading if, for example, atypical circumstances were experienced during the sampling. These circumstances could include an unusually wet or dry season, delivery of some unusual wastes during the sampling period, or errors in the sampling methodology. Any errors of this kind will be greatly magnified when a limited number of samples are taken to represent a community's entire waste stream for a year. Magnification of errors could be even more serious if a limited number of samples was relied upon for making the national estimates of MSW. Also, extensive sampling would be prohibitively expensive for making the national estimates. An additional disadvantage of sampling studies is that they do not provide information about trends unless performed in a consistent manner over a long period of time.

Of course, at the state or local level, sampling may not be necessary– many states and localities count all materials recovered for recycling, and many weigh all wastes being disposed to generate state or local recycling rates from the "ground up." To use these figures at the national level would require all states to perform these studies and perform them in a consistent manner conducive to developing a national summary, which so far has not been practical.

Materials flow. The second approach to quantifying and characterizing the municipal solid waste stream–the methodology used for this report–utilizes a materials flow approach to estimate the waste stream on a nationwide basis. In the late 1960s and early 1970s, EPA's Office of Solid Waste and its predecessors at the Public Health Service sponsored work that began to develop this methodology. These data tables represent the latest version of this database that has been evolving for over 40 years.

The materials flow methodology is based on production data (by weight) for the materials and products in the waste stream. To estimate generation data, specific adjustments are made to the production data for each material and product category. Adjustments are made for imports and exports and for diversions from MSW (e.g., for building materials made of plastic and paperboard that become construction and demolition debris.) Adjustments are also made for the lifetimes of products. Finally, food scraps, yard trimmings, and a small amount of miscellaneous inorganic wastes are accounted for by compiling data from a variety of waste sampling studies.

One problem with the materials flow methodology is that product residues associated with other items in MSW (usually containers) are not accounted for. These residues would include, for example, food left in a jar, detergent left in a box or bottle, and dried paint in a can. Some household hazardous wastes, (e.g., pesticide left in a can) are also included among these product residues.

Municipal Solid Waste Defined in Greater Detail

As stated earlier, EPA includes those materials that historically have been handled in the municipal solid waste stream–those materials from municipal sources, sent to municipal landfills. In these data tables, MSW includes wastes such as product packaging, newspapers, office and classroom paper, bottles and cans, boxes, wood pallets, food scraps, grass clippings, clothing, furniture, appliances, automobile tires, consumer electronics, and batteries. For purposes of analysis, these products and materials are often grouped in these data tables into the following categories: durable goods, nondurable goods, containers and packaging, food scraps and yard trimmings, and miscellaneous inorganic wastes.

Municipal solid wastes characterized in these data tables come from residential, commercial, institutional, or industrial sources. Some examples of the types of MSW that come from each of the broad categories of sources are:

Sources and Examples	Example Products
Residential (single-and multi-family homes)	Newspapers, clothing, disposable tableware, food packaging, cans and bottles, food scraps, yard trimmings

Commercial (office buildings, retail and wholesale establishments, restaurants)	Corrugated boxes, food scraps, office papers, disposable tableware, paper napkins, yard trimmings
Institutional (schools, libraries, hospitals, prisons)	Cafeteria and restroom trash can wastes, office papers, classroom wastes, yard trimmings
Industrial (packaging and administrative; *not* process wastes)	Corrugated boxes, plastic film, wood pallets, lunchroom wastes, office papers.

The materials flow methodology used in these data tables does not readily lend itself to the quantification of wastes according to their sources. For example, corrugated boxes may be unpacked and discarded from residences, commercial establishments such as grocery stores and offices, institutions such as schools, or factories. Similarly, office papers are mostly generated in offices, but they also are generated in residences and institutions. The methodology estimates only the total quantity of products generated, not their places of disposal or recovery for recycling.

Other Subtitle D Wastes

Some people assume that "municipal solid waste" must include everything that is landfilled in Subtitle D landfills. (Subtitle D of the Resource Conservation and Recovery Act deals with wastes other than the hazardous wastes covered under Subtitle C.) As shown in Figure 1, however, RCRA Subtitle D includes many kinds of wastes. It has been common practice to landfill wastes such as municipal sludges, nonhazardous industrial wastes, residue from automobile salvage operations, and construction and demolition debris along with MSW, but these other kinds of wastes are not included in the estimates presented in these data tables.

Figure 1: Municipal Solid Waste in the Universe of Subtitle D Wastes

Subtitle D Wastes	
The Subtitle D Waste included in these data tables is Municipal Solid Waste, which includes: Containers and packaging such as soft drink bottles and corrugated boxes Durable goods such as furniture and appliances Nondurable goods such as newspapers, trash bags, and clothing Other wastes such as food scraps and yard trimmings.	
Subtitle D Wastes not included in these data tables are: Municipal sludges Industrial nonhazardous wastes Construction and demolition debris	Agricultural wastes Oil and gas wastes Mining wastes

Figure 1-A: Definition of Terms

The materials flow methodology produces an estimate of total municipal solid waste generation in the United States, by material categories and by product categories.

The term ***generation*** as used in these data tables refers to the weight of materials and products as they enter the waste management system from residential, commercial, institutional, and industrial sources and before materials recovery or combustion takes place. Preconsumer (industrial) scrap is not included in the generation estimates. Source reduction activities (e.g., backyard composting of yard trimmings) take place *ahead of* generation.

Source reduction activities reduce the amount or toxicity of wastes before they enter the municipal solid waste management system. Reuse is a source reduction activity involving the recovery or reapplication of a package, used product, or material in a manner that retains its original form or identity. Reuse of products such as refillable glass bottles, reusable plastic food storage containers, or refurbished wood pallets is considered to be source reduction, not recycling.

Recovery of materials as estimated in these data tables includes products and yard trimmings removed from the waste stream for the purpose of recycling (including composting). For recovered products, recovery equals reported purchases of postconsumer recovered material (e.g., glass cullet, old newspapers) plus net exports (if any) of the material. Thus, recovery of old corrugated containers (OCC) is the sum of OCC purchases by paper mills plus net exports of OCC. If recovery as reported by a data source includes converting or fabrication (preconsumer) scrap, the preconsumer scrap is *not* counted towards the recovery estimates in these data tables. Imported secondary materials are also not counted in recovery estimates in this report. For some materials, additional uses, such as glass used for highway construction or newspapers used to make insulation, are added into the recovery totals.

Combustion of MSW with energy recovery, often called "waste-to-energy," is estimated in these data tables. Combustion of separated materials–wood and rubber from tires–is included in the estimates of combustion with energy recovery in these data tables.

Discards include MSW remaining after recovery for recycling (including composting). These discards presumably would be combusted without energy recovery or landfilled, although some MSW is littered, stored or disposed onsite, or burned onsite, particularly in rural areas. No good estimates for these other disposal practices are available, but the total amounts of MSW involved are presumed to be small.

Materials and Products Not Included in These Estimates

As noted earlier, other Subtitle D wastes (illustrated in Figure 1) are not included in these estimates, even though some may be managed along with MSW (e.g., by combustion or landfilling). Household hazardous wastes, while generated as MSW with other residential wastes, are not identified separately in these data tables. Transportation parts and equipment (including automobiles and trucks) are not included in the wastes characterized in these data tables.

Certain other materials associated with products in MSW are often not accounted for because the appropriate data series have not yet been developed. These include, for example, inks and other pigments and some additives associated with packaging materials. Considerable additional research would be required to estimate these materials, which constitute a relatively small percentage of the waste stream. Some adjustments are made in these data tables to account for packaging of imported goods, but there is little available documentation of these amounts.

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EPA Guidance to Conduct a Facility Walk Through for a Waste Assessment

A walk-through provides an opportunity to observe the connection between the types of waste generated and the actual waste-generating activities or processes. The team should be careful during the walk-through not only to record the types of waste observed and how waste is generated, but also to consider the potential waste reduction opportunities for increasing the efficiency of these operations.

If possible, schedule the walk-through just before trash pickups to allow a sufficient amount of waste to accumulate. Avoid scheduling it on or around holidays, company parties, or other special events that would produce wastes not representative of a normal workday.

Before conducting the walk-through, the team should inform the function area or department managers of the assessment and arrange interviews with employees. The interviews offer important additional detail on waste generation and removal practices. Moreover, interviews help keep employees informed and interested in the evolving waste reduction program and offer an opportunity to ask questions. Employees also can be a valuable source of ideas for reducing waste.

During the walk-through, ask questions about variations in daily waste generation. For example, periodic deliveries might result in more discards on the delivery day. In addition, ask about any recent or upcoming changes within the function area or department, such as new equipment or procedures that could alter the types or amount of waste generated. The worksheet is formatted so that you can print it out and use it to record your findings as you walk through your facility.

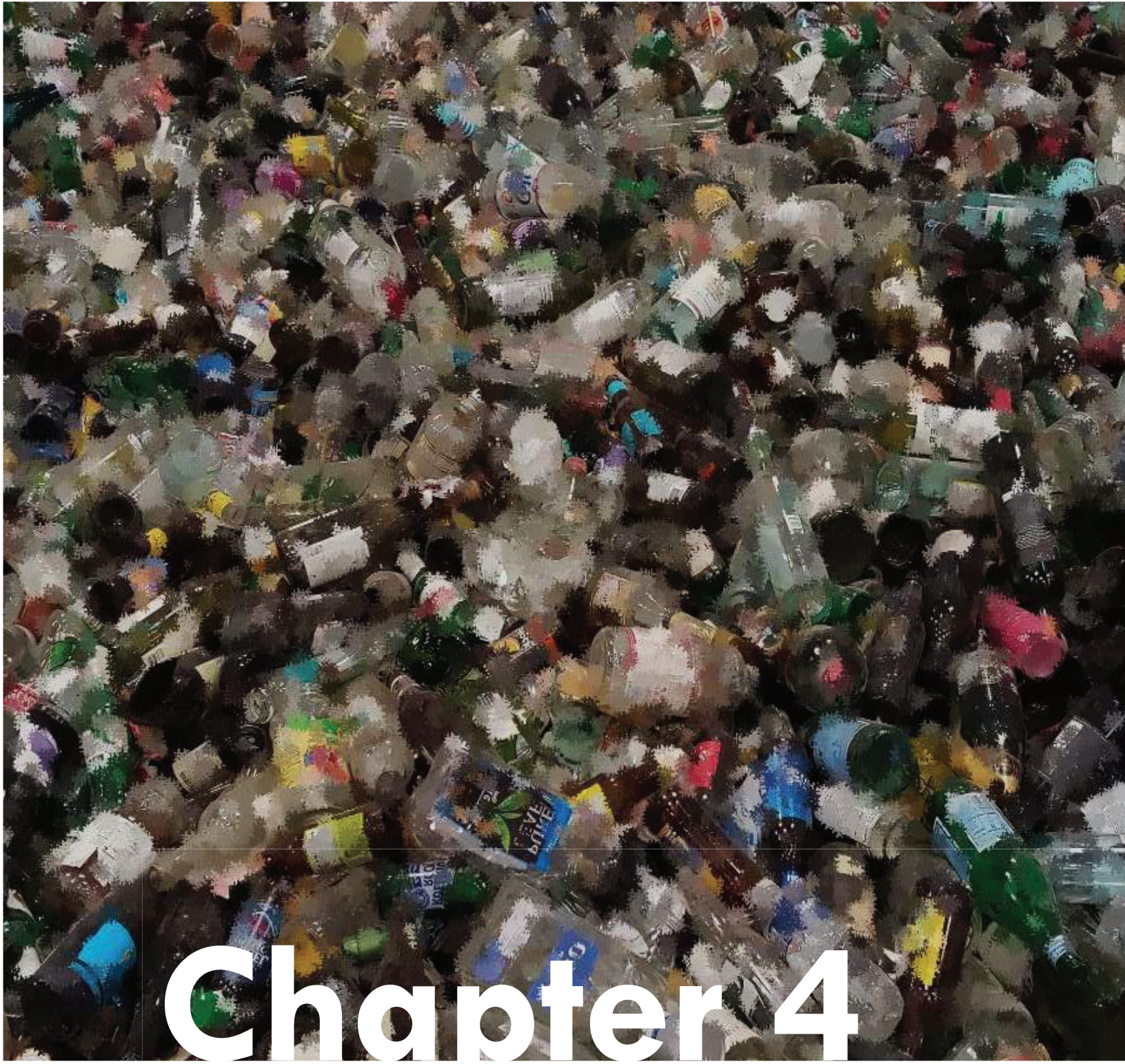
Be sure to pay close attention to areas and operations that tend to generate the largest amounts of waste, such as shipping and receiving departments, copying areas, cafeterias, assembly lines, and offices. Remember to include a review of the grounds maintenance operations. While conducting the walk-through, watch closely for activities and equipment that generate unnecessary waste, as well as waste reduction efforts that are already in place.

GBB Waste Sort Equipment & Supplies Checklist and Budgeting Example

Waste Sort Equipment & Supplies Checklist and Budgeting Example prepared by Gershman, Brickner & Bratton, Inc. on behalf of United States Environmental Protection Agency.

Facilities					
	Supplied By	**Quantity**	**Total Quantity**	**Cost/Unit**	**Total Cost**
Indoor sorting area					
Indoor bathroom facilities					
Access to electricity					
Sorting tent (20' x 30')					
Portable toilet					
Portable hand and eye washing stations					
				Subtotal	
General Equipment					
	Supplied By	**Quantity**	**Total Quantity**	**Cost/Unit**	**Total Cost**
Heavy duty scale (min. 300 lb. capacity with extra batteries)		1			
Shovels					
Rakes					
Brooms					
				Subtotal	
General Supplies					
	Supplied By	**Quantity**	**Total Quantity**	**Cost/Unit**	**Total Cost**
Work Tables, *(1-2) per 2-8 staff* ***Supply & Food Table,*** *(1) per up to 12 staff*	Supplied By	Quantity	Total Quantity	Cost/Unit	Total Cost
Work Table					
Supply & Food Table					
				Subtotal	
Sorting Supplies					
	Supplied By	**Quantity**	**Total Quantity**	**Cost/Unit**	**Total Cost**
96-gallon plastic trash can/cart					
64-gallon plastic trash can/cart					
32-gallon plastic tote					
18-gallon plastic tote					
5-gallon plastic bucket					

Large paint sticks		2/week for each sorter			
Whisk broom and dustpan set		3 sets per sorting table			
Data sheets					
Container labels					
Heavy Duty Duct tape		1 roll			
Magnet (can be small)		1			
Tarp (20' x 16')					
				Subtotal	
Personal Protective Equipment Supplies					
	Supplied By	**Quantity**	**Total Quantity**	**Cost/Unit**	**Total Cost**
Protective coverall suits		1/day for each sorter			
Protective sleeves		12 sleeves/day for each sorter			
Puncture-resistant gloves		2 pairs/week for each sorter			
Nitrile gloves		20 gloves/day for each sorter			
Dust masks		1 mask/day for each sorter			
Disposable face masks		3 masks/day for each sorter			
Safety glasses/goggles		1 pair for each sorter			
Hand sanitizer					
First Aid Kit		1			
				Subtotal	
Staff Supplies					
	Supplied By	**Quantity**	**Total Quantity**	**Cost/Unit**	**Total Cost**
Water					
Other Drinks (e.g. sports drinks)					
Snacks (individually packaged, easy to eat)					
Paper Towels					
Permanent Markers					
				Subtotal	
				Subtotal All Categories	
				Contingency	
				Grand Total	



Chapter 4

Waste Sort Planning & Preparation

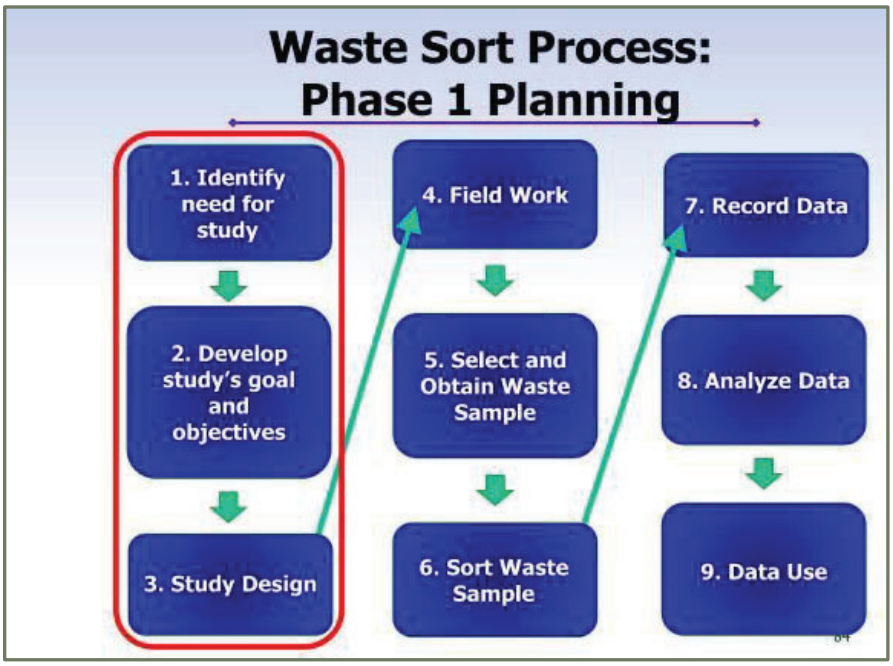
Chapter 4

A waste sort is the process of collecting random and representative samples of a particular waste stream and manually sorting these samples into individual waste components by material type. It is a systematic process used to identify, sort, and analyze material types in a particular waste stream. The three phases of a waste are planning, field work, and data analysis.

The design of your tribe's waste sort depends on many factors, including study goals/objectives, volume of community waste generated, data needs, staff, budget, time, and available resources and equipment. A successful waste sort begins with a sorting plan that is based on the desired data and goals for the sort while the field work should ensure the safety of waste sort participants. Data from a waste sort can be statistically analyzed to understand the detailed composition of the waste stream to help in planning how to reduce waste, set up recycling programs, and conserve money and resources.

Learning Objectives

1. *Identify need for study and its goals & objectives*
2. *Understand how to design the study and plan a waste sort*


Waste Sort Process:
Phase 1 Planning
1. Identify need for study
2. Develop study's goal and objectives
3. Study Design
4. Field Work
5. Select and Obtain Waste Sample
6. Sort Waste Sample
7. Record Data
8. Analyze Data
9. Data Use

Notes:


Waste Sort Process:
Phase 1 Planning
1. Identify need for study
2. Develop study's goal and objectives
3. Study Design
• Identify waste stream
• Material supply / collection & delivery
• Sort Location
• Staff, Budget, and Supplies
• Sampling & Sorting Plan
• Post-Sort Disposal
• Health & Safety Plan
• Other Preparations
85

Notes:

Waste Sort Vs. Other Assessment Types

A waste sort provides better data than records and visual assessments by allowing you to:

- Collect **detailed information on the quantity** of waste generated
- Identify **specific waste material types**
- Collect **reliable and accurate data** that can be used to make **informed decisions for programs and services**

86

Notes:

Develop Goals and Objectives

What questions do you want to answer by conducting a waste sort?

- Identify where/who is generating waste
- Identify **educational and outreach opportunities**
- Identify the **types of materials** disposed
  - Recyclables
  - Food and yard waste, or other organics
  - Reusable materials or objects
  - Electronics and/or household hazardous waste
  - C&D debris

87

Notes:

Study Design

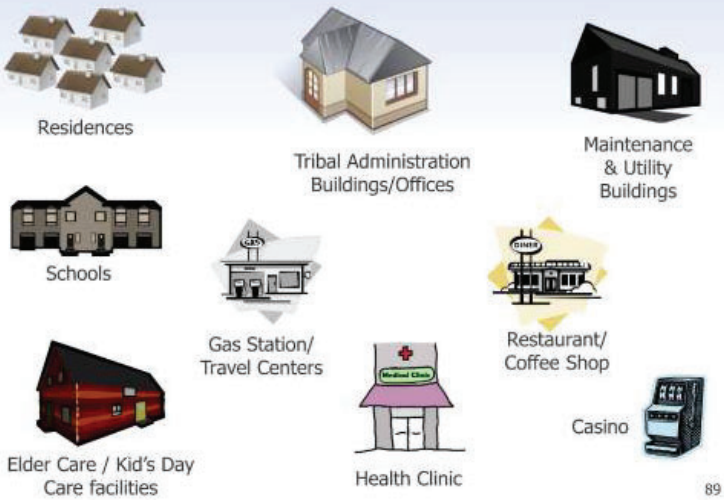
Study design is based on data needed to develop a statistical representation of waste generation

- Important information to consider and plan:
  - Identify **waste generation sectors or individuals** to be studied
  - Think about your community – where is waste being created?

88

Notes:

Study Design



89

Notes:

Study Design – Collecting Material for Sorting

Important information to consider and plan:

- Outline **how you will collect the waste or have the waste delivered**
  - Note any **activities that may impact waste disposal**, such as scavenging, unauthorized dumping, or special events
  - If waste will be delivered to sort area, **coordinate dates and procedures** with haulers and collection vehicles

90

Notes:

Study Design - Location

Select **location** to conduct the sort:

- Should be **easy to access** with equipment and vehicles and provide **level floor or ground**
- Ideal to be **shielded from weather**, with adequate **ventilation**

91

Notes:

Study Design - Location

Select **location** to conduct the sort:

- Consider **access to emergency healthcare facilities** and on-site bathrooms and eye wash stations
- **Coordinate dates and times, permissions, logistics, protocols, and communication procedures with facility managers** for the selected location

92

Notes:

Study Design – Staffing

Determine **staffing availability** for the sort crew members:

- Field Manager
- Waste sort crew – at least 2 people (more will make the sort go faster and allow you to sort more materials!)
- Waste facility/sort location point of contact
- Tribal emergency contact
- *Can you recruit volunteers from the community or hire short-term day workers?*

93

Notes:

Study Design – Budget & Supplies

Develop **budget availability** for the sort, considering the need to purchase for the crew:

Personal Protective Equipment (PPE)

- High visibility vests
- Hard hats
- Protective coveralls and sleeves
- Eye protection (glasses or goggles)
- Ear protection (depending on site conditions)

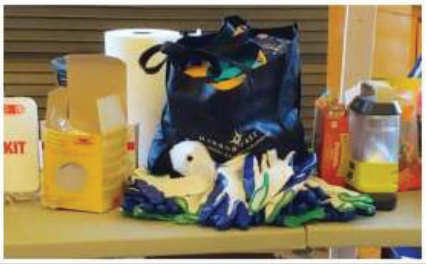
94

Notes:

Study Design – Budget & Supplies

Personal Protective Equipment (PPE), continued:

- Dust masks
- Nitrile gloves (inner layer)
- Durable textile/rubber/leather gloves (outer layer, puncture resistant)



95

Notes:

Study Design – Budget & Supplies

Develop **budget availability** for the sort, considering the need to purchase:

General waste sorting supplies:

- Assorted size and types of containers to collect and move sorted materials
  - 55+ gallon cans or totes
  - 20-gallon bins
  - 5-gallon buckets
- Labels or signs for sorting bins

96

Notes:

Study Design – Budget & Supplies

97

Notes:

Study Design – Budget & Supplies

General waste sorting supplies, continued:

- Folding tables or other elevated sorting surface
- Large tarp(s)
- Large utility broom
- Assorted sizes and types of shovels – should be metal and wood to support heavy weight
- Utility knife for opening bags
- Pickers (optional)
- Large paint sticks, or similar, to move materials around sorting surface

98

Notes:

Study Design – Budget & Supplies

99

Notes:

Study Design – Budget & Supplies

100

Notes:

Study Design – Budget & Supplies

General waste sorting supplies, continued:

- Heavy-duty portable scale, with digital display and extra battery
  - Weight capacity of at least 300 pounds
  - Accuracy within 0.1 or 0.2 pounds

101

Notes:

Study Design – Budget & Supplies

Develop **budget availability** for the sort, considering the need to purchase:

Other miscellaneous supplies:

- Clipboards for data recording sheets
- Portable toilets (if restrooms unavailable nearby)
- Portable eye wash station (if unavailable at location)
- Large garbage bags
- Pens and markers
- Tape

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Notes:

Study Design – Budget & Supplies

Other miscellaneous supplies, continued:

- First aid kit
- Hand sanitizer
- Anti-bacterial/sanitizing wipes & spray
- Paper towels

103

Notes:

Study Design – Budget & Supplies

Other miscellaneous supplies, continued:

- Camera
- Folding table for water and refreshment station (if table or other suitable surface not available)
- Water, sports drinks, and snacks

104

Notes:

Study Design – Plan & Protocols

The study design is largely influenced by:

- Study goals and objectives
- Staff availability
- Budget and available time, resources, and equipment
- How much waste is generated in your community
- How accurate you need the data to be

A larger number of samples taken over a longer time period will produce more accurate results

105

Notes:

Study Design – Plan Standards

- The most reliable and accurate results come from sorts done over a period of at least 5 days, with 40-50 samples of 200-300 pounds each
- A well-trained crew of 10-14 people can sort 8-10 x 200-300 pound samples per day
- Recognize that things don't always go according to plan!

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Notes:

Study Design – Plan Standards

You may decide to modify your study to sort all waste in a load or from a particular generator at one time. This means that your results will only tell you **the composition of waste at a single snapshot or point in time** and will not provide representative results for the entire community.

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Notes:

Study Design – Sampling Plan

A sampling plan should be tailored for each study and/or facility. Consider:

- Waste generating sectors
- Waste quantities by generating sector and hauler (if applicable)
- Target number of samples by waste generating sector and hauler – how many days will it take to achieve the target number of samples?

The plan should be reviewed by facility staff.

108

Notes:

Study Design – Sampling Plan

Example Sampling Plan: by Individual Generator/Generator Type

Individual Generator / Generator Type	Annual Tons of Waste	% Share of Total Stream	Number of Samples by % Share
Tribal HQ	3,500	10%	5
Health Clinic	5,000	14.3%	7
Community Center	2,500	7.1%	4
Casino	14,000	40%	20
Residences	10,000	28.6%	14
Totals	**36,000**	**100%**	**50**

109

Notes:

Study Design – Sampling Plan

Example Sampling Plan: by Neighborhood or Hauler

Neighborhood or Hauler	Annual Tons of Waste	% Share of Total Stream	Number of Samples by % Share
A	5,000	14.3%	7
B	8,000	22.9%	12
C	3,000	8.5%	4
D	12,000	34.3%	17
E	7,000	20%	10
Totals	**35,000**	**100%**	**50**

110

Notes:

Study Design – Sampling Plan

- Use the sampling plan as a guide to finalize staffing needs and schedule
- Make adjustments as necessary
- Remember things may change on the day or week of the sort – try to stay flexible!

111

Notes:

Study Design – Sorting Plan

- Based on the desired data and goals for the sort, develop your material categories
- Generally, you will want at least 15 but less than 40 categories
- Most often, 20 – 30 categories will be good for most needs

112

Notes:

Study Design – Potential Material Categories

Material Category	No.	Material Type
Fiber	1	Old Corrugated Cardboard (OCC)
	2	Kraft Paper and Board
	3	Old News Print (ONP)
	4	High Grade Office Paper
	5	Magazines / Catalogs
	6	Mixed Recyclable Paper
	7	Gable Top Containers / Aseptic Cartons
	8	Non-Recyclable Paper
Glass	9	Clear Glass
	10	Brown Glass
	11	Green Glass
	12	Non-Recyclable Glass

Material Category	No.	Material Type
Plastic	13	#1 PET Bottles
	14	#2 HDPE Bottles (Natural)
	15	#2 HDPE Bottles (Colored)
	16	#5 Polypropylene (PP)
	17	#3 - #7 Mixed
	18	Film and Flexible Packaging
	19	Expanded Polystyrene Foam
	20	Non-Recyclable and Bulky Plastics
Metal	21	Ferrous Metal Containers
	22	Aluminum Cans
	23	Other Metals

Notes:

Study Design – Potential Material Categories

Material Category	No.	Material Type
Organics	24	Food Waste
	25	Yard Waste
	26	Compostable Fibers
	27	Other Organics
	28	Textiles, Leather, and Rubber
HHW	29	Household Hazardous Waste
Electronics	30	All Electronics
C&D	31	Wood
	32	Carpet and Padding
	33	Gypsum Board
	34	Asphalt Roofing
	35	All Other C&D
Other	36	Bulky or Composite Items
	37	Fines and Dirt
	38	Other Residue

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Notes:

Study Design – Post-Sort Disposal

Determine in advance what you will do with the materials after sorting

- Can you **recycle** the sorted recyclables?
- Can you **compost** the food and yard waste?
- What **containers** will you need to collect the materials? Depends on size of sort
- Do you need to **arrange for transportation** in order to dispose, recycle, or compost the materials after the sort?

115

Notes:

Study Design – Post-Sort Disposal

116

Notes:

Study Design – Health & Safety Plan

- Develop a **Health & Safety Plan** well in advance of the sort – **safety is the most important priority!**
- **Keep a copy on site during the sort**
- The H&S Plan should include:
  - Who is responsible for the H&S of the crew during the sort, and what those responsibilities are
  - List of safety equipment required
  - Outline of safe site procedures
  - List of potential hazards

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Notes:

Study Design – Health & Safety Plan

- Safety inspection requirements
- Decontamination and cleaning protocols
- Emergency protocols, incident reporting, and evacuation procedures
  - Where is the nearest hospital?
  - What will you do in the event of:
    - Injury / Accident
    - Spill or Splash
    - Fire
    - Hazardous or Infectious waste

118

Notes:

Other Preparations

Establish additional baseline information:

- Points of contact information
  - Waste management decision makers and primary staff
  - Tribal Council
  - Tribal Economic, Business, or Community Development teams
- Current waste management program, including staff, contracts, and costs

119

Notes:

Other Preparations

- Community demographics – will this influence your sort planning or activities?
  - Tribal/nontribal populations, tourist populations, etc.
- Community outreach about the sort activities

120

Notes:

Chapter 4 Review

1. A waste sort should identify the who, what, when, and where of waste generated in your community

2. A sampling plan should be tailored for each study and/or facility and consider waste generating sectors, waste quantities by generating sector and/or hauler and target number of samples

3. A sorting plan is based on the desired data and goals for the sort and identifies the material categories that will be sorted

4. The design of the waste sort depends on: study goals/objectives, volume of community waste generated, data needs, staff, budget, time, and available resources and equipment

123

Notes:

Chapter 4 Review

5. A larger number of samples taken over a longer time period will produce more accurate results

6. Be sure to create a budget to purchase supplies for the sort (ex. PPE)

7. Develop a health and safety plan in advance. The plan should include responsibilities, equipment, site procedures, potential hazards, safety monitoring, and emergency procedures.

8. Determine what will happen to the waste once sorted and analyzed

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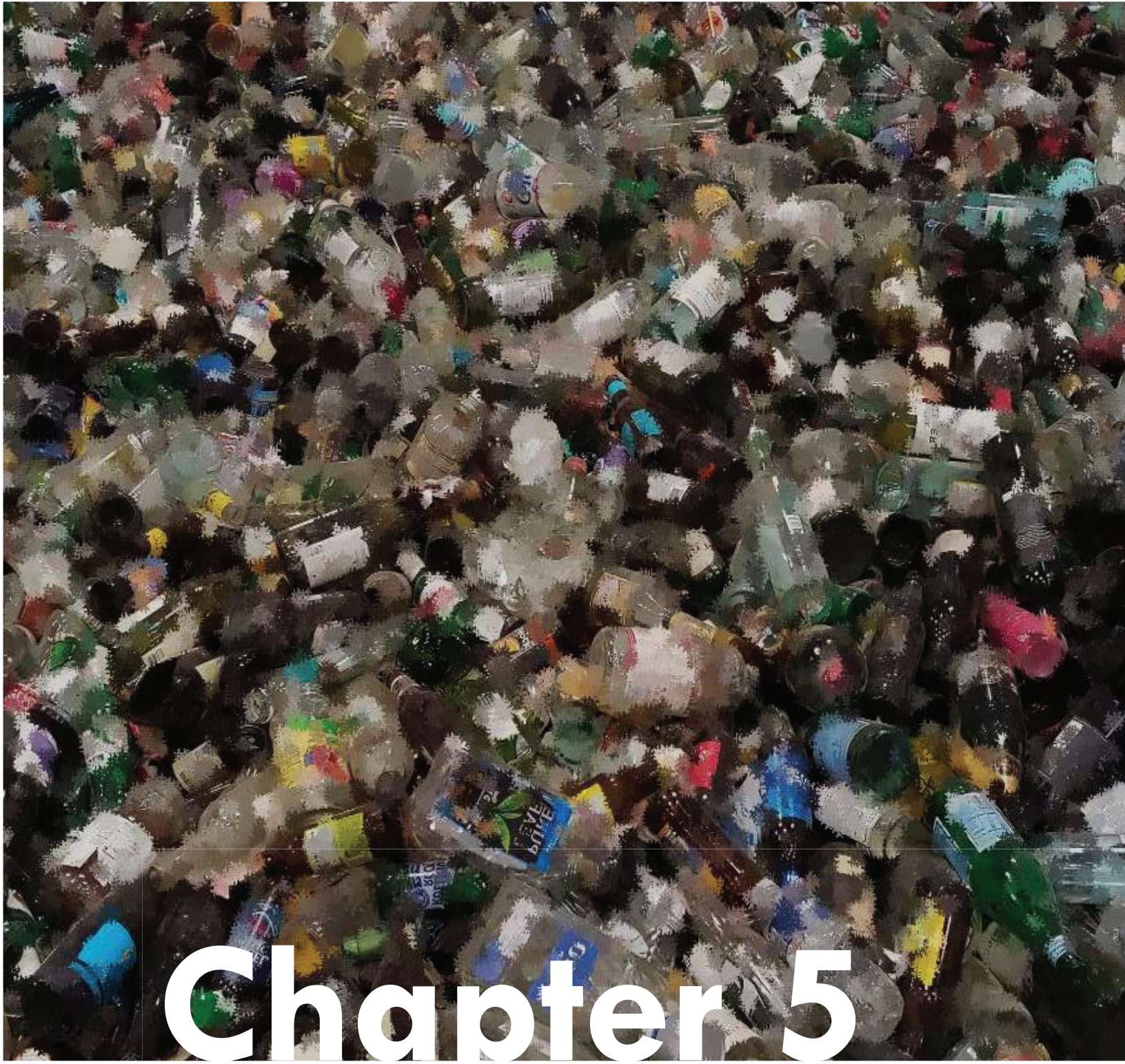
Notes:



Chapter 5

Waste Sort Field Work

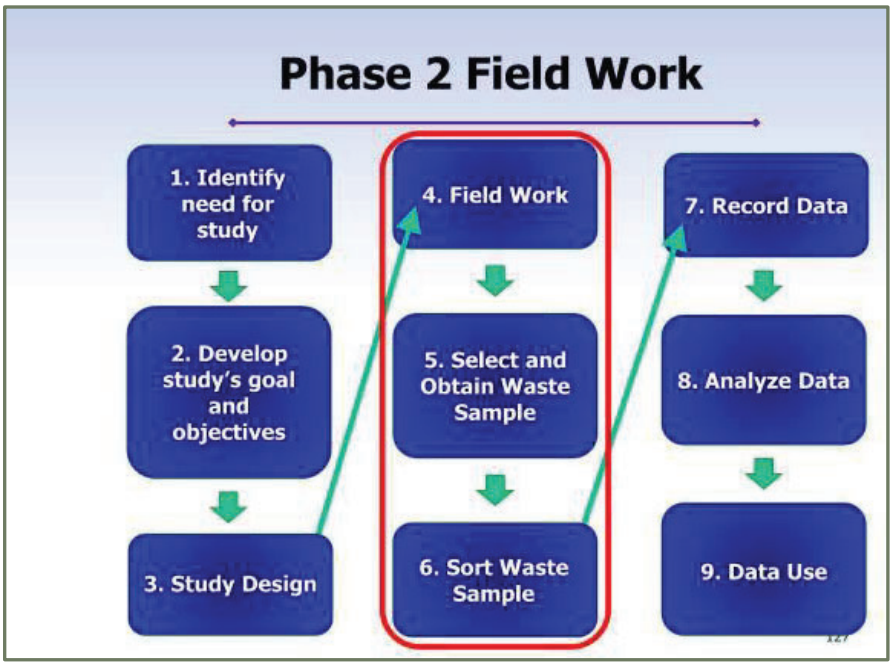
Chapter 5

The conditions for each waste sort are unique. Waste sort plans can change due to facility environments, staffing and equipment availability, and weather. During field work, the sampling plan and other aspects of the study design may need to be modified. It is important to adjust project goals and objectives based on what is feasible and make the most out of the available resources and circumstances.

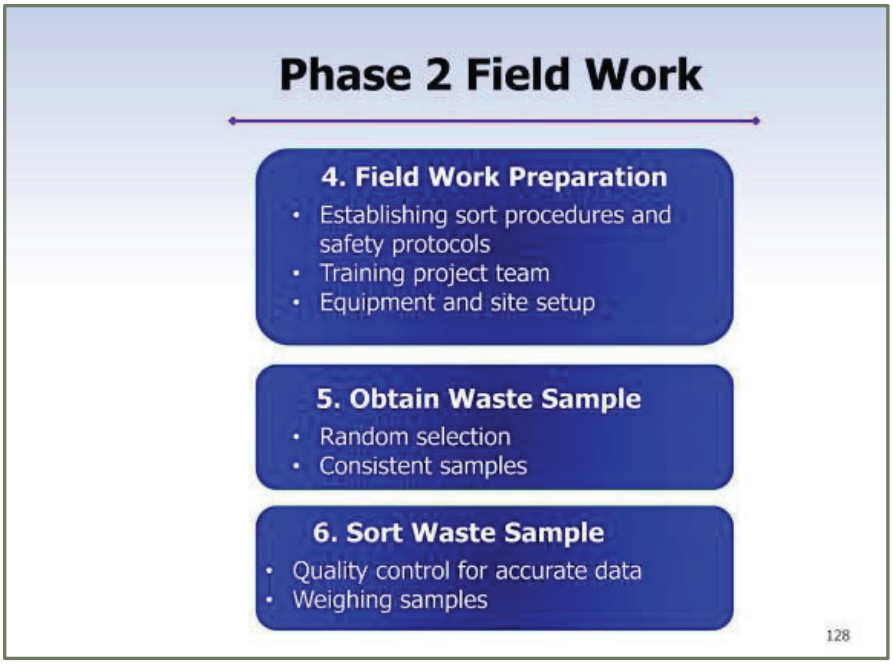
Above all, the personnel involved in the sort should receive thorough training in order to anticipate the steps required so that health and safety can be maintained at all times. Protocols should be established for selecting, sorting, and weighing the waste samples to ensure the best use of staff and time.

Learning Objectives

1. *Site set-up for the waste sort*
2. *Personnel training for the waste sort*
    - ► *Health and safety*
    - ► *Material sorting*
3. *Protocols for selecting, sorting, and weighing the waste sample*


Phase 2 Field Work
1. Identify need for study
2. Develop study's goal and objectives
3. Study Design
4. Field Work
5. Select and Obtain Waste Sample
6. Sort Waste Sample
7. Record Data
8. Analyze Data
9. Data Use

Notes:


Phase 2 Field Work
4. Field Work Preparation
• Establishing sort procedures and safety protocols
• Training project team
• Equipment and site setup
5. Obtain Waste Sample
• Random selection
• Consistent samples
6. Sort Waste Sample
• Quality control for accurate data
• Weighing samples
128

Notes:

Assess the Field Situation

Conditions at solid waste facilities vary

- Guidelines:
  - Do not despair if things don't go as planned
  - Document changes in plans
  - Adjust project goals and objectives based on what is feasible
  - Communicate change(s) to everyone involved
  - Focus on obtaining representative data
  - Do the best you can with the conditions/resources available

The sampling plan and other aspects of the study design may need to be modified

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Notes:

Equipment Needs

- Sort table(s)
- Tarp(s)
- Containers
  - 2 to 3 different sizes
    - Ex: 5-gallon buckets, 18-gallon plastic totes, and 64-gallon trash carts
  - Number depends on waste sort categories
  - Material category labels
    - Pictures are best
    - Can write on side of container with permanent marker
  - Record tare weights (empty)

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Notes:

Equipment Needs

- Scale
  - Capable of weighing at least 300 pounds
  - Calibrated and accurate within 0.1 or 0.2 pounds
  - Having two is ideal, one for backup
- Tools
  - Shovel
  - Broom
  - Large paint sticks
- Facilities
  - Protect work crew from the elements, ex. tent
  - Hand and eye washing station
  - Restrooms

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Notes:

Training

- Important all project team members understand:
  - Individual roles and responsibilities
  - Goals and objectives of the study
  - Health, safety, and emergency requirements and reporting
- Lead field manager must train team:
  - Obtaining waste samples
  - Sorting techniques
  - Identifying material groups and categories
  - Handling dangerous materials

133

Notes:

Health and Safety

Priority #1!

- Be aware of hazards:
  - Truck/vehicle traffic
  - Waste materials
  - Weather conditions
  - Hostile people/animals

134

Notes:

Health and Safety

- Personal protective equipment (PPE):
  - Steel-toed shoes or boots
  - Safety glasses
  - High visibility vests
  - Gloves, a pair of each:
    - Nitrile/rubber (inside)
    - Puncture resistant (outside)
  - Dust masks
  - Protective coveralls and sleeves
  - Ear protection
  - Hard hat
- Other:
  - Hand cleaner/sanitizer
  - Drinking water, snacks

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Notes:

Selecting Waste Samples

- Safety is most important!
  - Working near heavy equipment and trucks
- Use sampling plan as a guide
- Communicate with facility staff
- Randomly select trucks
  - Confirm waste origin/source
  - Avoid sampling mixed wastes, if possible

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Notes:

Selecting Waste Samples

- Direct truck diver to offload waste near disposal area
  - Safety is most important
  - Full access to visually inspect waste load
  - Note unusual characteristics
  - Use a tarp to cover offload site
- Obtain sample
  - Identify location of waste pile to obtain sample
  - Hand tools (shovel, scoop)
  - Equipment (loader, other heavy machinery, if applicable)
  - Place waste in containers
  - Weigh sample presort, if possible/applicable

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Notes:

Waste Sorting

- Load sample on sort table
- Tear open bags containing waste
- Place individual materials in separate containers
- Separate composite items to extent possible
  - i.e. remove food scraps from containers
  - Take apart materials that are stuck together

140

Notes:

Quality Control During Sorting

- Materials can be deceiving and recycling symbols can be hard to find
- Always ask your waste sort Lead Field Manager if you are unsure or need help

142

Notes:

Quality Control After Sorting

- Be sure to check sorted material for accuracy

143

Notes:

Weighing Sorted Materials

- Use appropriate capacity scales
- Weigh all containers:
  - With sorted materials, even if a small amount
  - Empty weight of material containers should also be recorded
- Record weights on data sheet
  - 0.1- or 0.2-pound increments should be sufficient in most cases
  - Include notes for any unusual items
  - Write neatly!

144

Notes:

Weighing Sorted Materials

- Multi-person effort
  - Task designation will increase efficiency, e.g., assign one person to oversee recording material weights for the duration of waste sort

145

Notes:

Data Recording

- Very important! Treat data like gold!
- Separate data sheet for **each** sample
- Record detail of waste sample:
  - Date/time sample obtained
  - Hauler name/truck number
  - Waste generating sector
  - Location where waste was collected
  - Weather conditions
  - Segment of waste pile where sample is collected
- Material weights are recorded on sample data sheet

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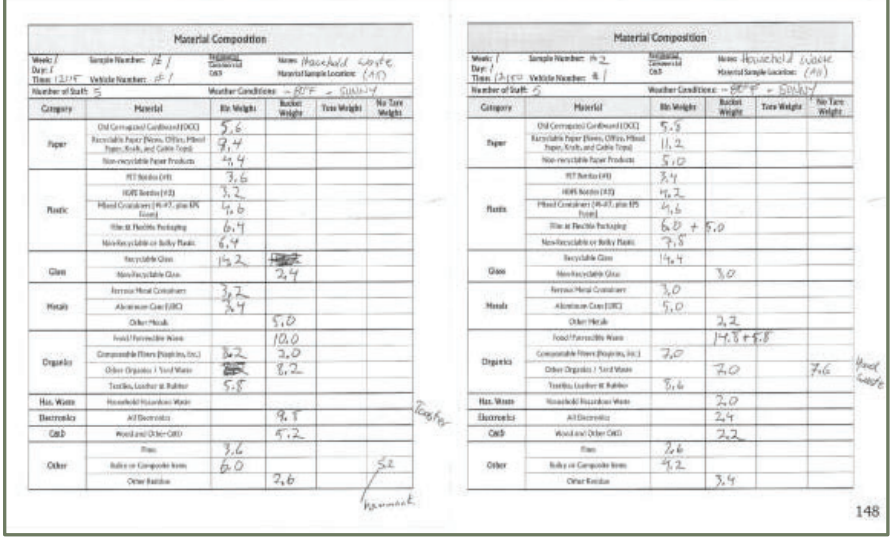
Notes:

Review Completed Data Sheets



Material Composition

Category	Material	Bin Weight	Bucket Weight	Tare Weight	No Tare Weight
Paper	Old Corrugated Cardboard (OCC)	5.6			
	Recyclable Paper (News, Office, Mixed Paper, Kraft, and Cable Type)	9.4			
	Non-recyclable Paper Products	4.4			
Plastic	PET Bottles (#1)	3.6			
	HDPE Bottles (#2)	3.2			
	Mixed Containers (#4-#7, plus EPS Foam)	4.6			
	Film & Flexible Packaging	6.4			
	Non-Recyclable or Bulky Plastic	6.4			
Glass	Recyclable Glass	14.2			
	Non-Recyclable Glass		2.4		
Metals	Ferrous Metal Containers	3.7			
	Aluminum Cans (UBC)	3.4			
	Other Metals		5.0		
Organics	Food / Putrescible Waste		10.0		
	Compostable Fibers (Napkins, Etc.)	3.2	2.0		
	Other Organics / Yard Waste		8.2		
	Textiles, Leather & Rubber	5.8			
Haz. Waste	Household Hazardous Waste				
Electronics	All Electronics		9.8		
C&D	Wood and Other C&D		4.2		
Other	Fines	3.6			
	Bulky or Composite Items	6.0		5.2	
	Other Residue		2.6		

Material Composition

Category	Material	Bin Weight	Bucket Weight	Tare Weight	No Tare Weight
Paper	Old Corrugated Cardboard (OCC)	5.8			
	Recyclable Paper (News, Office, Mixed Paper, Kraft, and Cable Type)	11.2			
	Non-recyclable Paper Products	5.10			
Plastic	PET Bottles (#1)	3.4			
	HDPE Bottles (#2)	4.2			
	Mixed Containers (#4-#7, plus EPS Foam)	4.6			
	Film & Flexible Packaging	6.0 + 5.0			
	Non-Recyclable or Bulky Plastic	7.8			
Glass	Recyclable Glass	14.4			
	Non-Recyclable Glass		3.0		
Metals	Ferrous Metal Containers	3.0			
	Aluminum Cans (UBC)	5.0			
	Other Metals		2.2		
Organics	Food / Putrescible Waste		14.8+5.8		
	Compostable Fibers (Napkins, Etc.)	7.0			
	Other Organics / Yard Waste		7.0	7.6	
	Textiles, Leather & Rubber	5.6			
Haz. Waste	Household Hazardous Waste		2.0		
Electronics	All Electronics		2.4		
C&D	Wood and Other C&D		2.2		
Other	Fines	2.6			
	Bulky or Composite Items	4.2			
	Other Residue		3.4		

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Notes:

Chapter 5 Review

1. All personnel involved in the sort should be trained to anticipate the steps required, so that health and safety can be maintained.
2. Protocols should be established for selecting, sorting, and weighing the waste samples to ensure the best use of staff and time.
3. Ensure all necessary equipment is available or plan to bring it to the sort location.
4. Record the sample information in a logical format for easy interpretation using pre-formatted data sheets.

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Notes:

Chapter 5 Supplemental Materials

EPA Guide to Conducting a Waste Sort

Beginning the Waste Sort

1. Assemble the waste sample to be sorted, using either one day's worth of waste or an otherwise representative sample of waste from your organization.
2. Obtain containers for holding the sorted wastes and a scale for weighing the samples. The size of the containers depends on the amount of waste to be sorted. Office wastebaskets might work well for small sorts. For lager sorts, 30- to 50-gallon plastic containers, garbage cans, or large corrugated cardboard boxes will be needed.
3. Weigh the empty containers that the sorted wastes will be placed into and record these weights on a label on each container.
4. Sort the waste sample by major component (paper, plastics, glass, metal, compostable organics, other),
5. Further sort each major waste component into more specific component subcategories (e.g., glass into clear, green, and; or paper into high grade, newspaper, and magazines).
6. Place the sorted materials into separate labeled containers.

Calculations

Weigh each filled waste container and subtract the weight of the container to obtain the net component weight. Use the worksheet to record the findings of your waste sort by filling in the white spaces only. All other colored spaces will be automatically populated.

Waste Sort Material Category Weigh-Out Worksheet Example

This is an example of a waste sort material category weigh-out worksheet. This list can be modified and simplified, e.g., by combining multiple paper types or plastic types, to meet inividual waste sort needs and objectives. Material types may also be added as needed for your community's waste stream.

Material Composition					
Week: **Day:** **Time:**	**Sample Number:** **Vehicle Number:**	**Residential** **Commercial** **C&D**	**Material Sample Location:**		
Number of Staff:		**Weather Conditions:**			
Category	**Material**	**Bin Weight**	**Bucket Weight**	**Tote Weight**	**No Tare Weight**
	Tare (Weight of empty container):				
Paper	Old Corrugated Cardboard (OCC)				
	Old Newsprint (ONP)				
	Office Paper/Magazines				
	Gable Top/Aseptic Containers				
	Other Mixed Recyclable Paper/Kraft				
	Non-recyclable Paper Products				
Plastic	PET Bottles (#1)				
	PET Containers/Packaging (#1)				
	HDPE Color (#2)				
	HDPE Natural (#2)				
	Mixed Bottles/Containers (#3-#7)				
	EPS Foam (#6)				
	Film & Flexible Packaging				
	Mixed Rigid Bulky				
	Non-Recyclable Rigid Plastic				
Glass	Recyclable Glass				
	Non-Recyclable Glass				
Metals	Ferrous Metal Containers				
	Aluminum Cans (UBC)				
	Other Metals				
Organics	Food/Putrescible Waste				
	Compostable Fibers (Napkins, Etc.)				
	Other Organics				
Textiles	Re-Usable Textiles				
	Non-recyclable Textiles				
	Leather & Rubber				

Haz. Waste	Household Hazardous Waste				
Electronics	All Electronics				
C&D	Wood				
	Other C&D				
Other	Fines				
	Diapers				
	Other Bulky or Composite Items				

Waste Sort Material Category Weigh-Out Worksheet Example prepared by Gershman, Brickner & Bratton, Inc. on behalf of United States Environmental Protection Agency.

Chapter 6

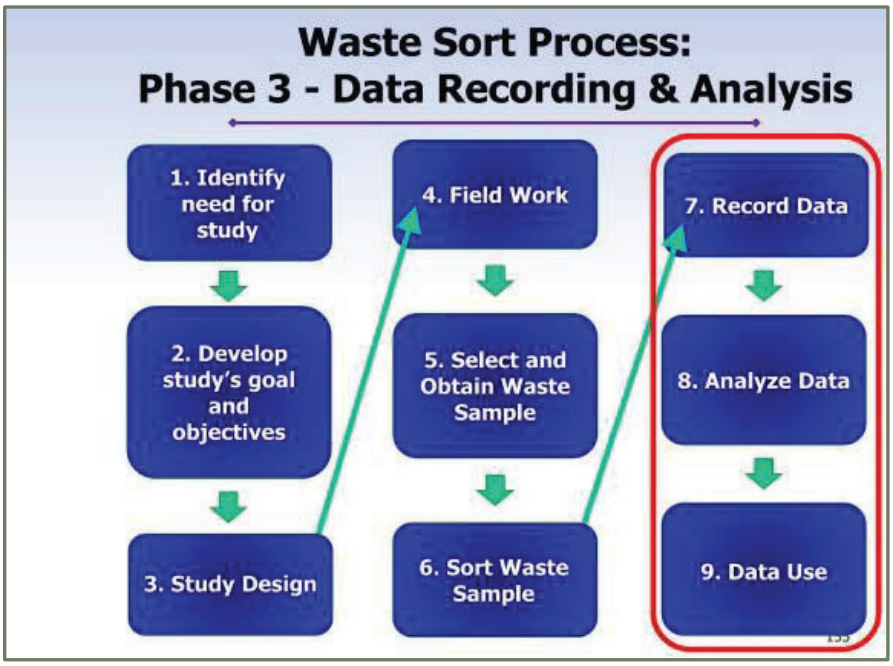
Waste Sort Data Management

Chapter 6

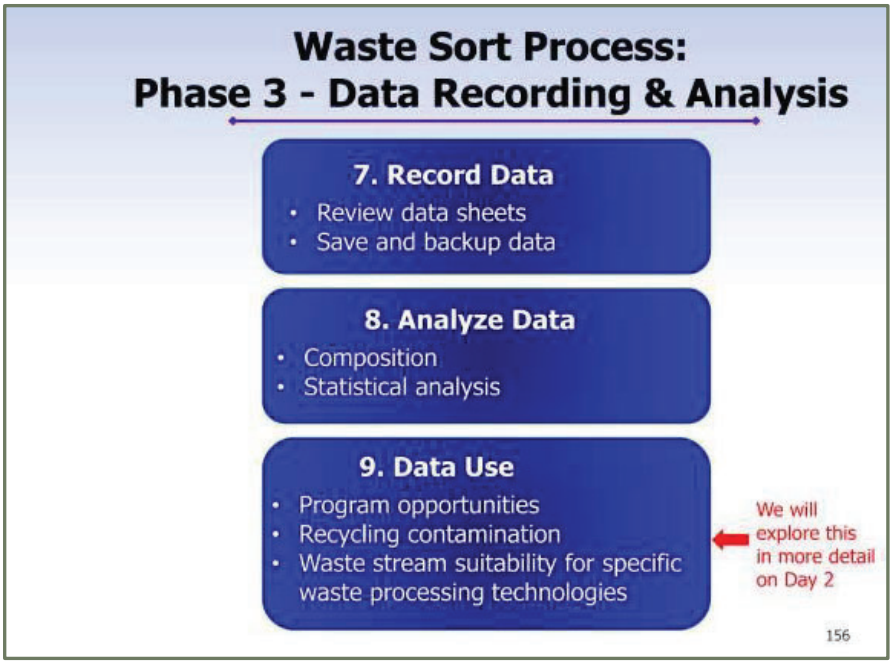
Data record keeping includes good habits both during and after the waste sort. It is important during the sort to take notes about atypical circumstances that could impact data results, such as weather conditions that could possibly create wet and heavy waste, large or bulky items, or unusual materials. Raw data sheets should be legible, complete, and digitally copied, such as by taking a cell phone picture, to ensure data preservation. After the sort, data gathered will be used to determine the percentage of each material category within the stream for each sample, generating sector or source, and for an overall average.

Learning Objectives

1. *Understand the importance of data record keeping*
2. *How to input, review, and analyze waste sort data*
3. *Basic statistical analysis of data*


Waste Sort Process:
Phase 3 - Data Recording & Analysis
1. Identify need for study
2. Develop study's goal and objectives
3. Study Design
4. Field Work
5. Select and Obtain Waste Sample
6. Sort Waste Sample
7. Record Data
8. Analyze Data
9. Data Use

Notes:


Waste Sort Process:
Phase 3 - Data Recording & Analysis
7. Record Data
• Review data sheets
• Save and backup data
8. Analyze Data
• Composition
• Statistical analysis
9. Data Use
• Program opportunities
• Recycling contamination
• Waste stream suitability for specific waste processing technologies
We will explore this in more detail on Day 2
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Notes:

Recording the Data

1. **During the Sort:** Review raw data forms
   - After sorting each sample
   - Take good notes
   - Identify missing information
2. **After the Sort:** Transfer raw data to a computer
   - Use spreadsheet software
   - Weigh-out sheet should be used as a template for spreadsheet
   - Transfer all data, including notes
3. **After Data Entry:** Calculate materials' weights
   - Subtract container tare weight
4. **Keep data safe and organized!**

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Notes:

Recording the Data

Sample data entry spreadsheet setup

		Container Weight			2.51						
		Bucket Weight			2.16						
		Tote Weight			12.2						
Total Weight	6530.94								Day1		
		Day							1		
		Sort							1		
		Cumulative Sort							1		
		Category	#C	#B	#T	Bin	Bucket	Tote	No Tare	Total	Notes
1	Fiber	Old Corrugated Cardboard (OCC)	2	0	0	9.2				4.2	
2		Old Newsprint (ONP)	0	0	0					0.0	
3		Office Paper/Magazines	2	0	0	7.8				2.8	
4		Gable Top/Aseptic Containers	1	0	0	2.6				0.1	
5		Other Mixed Recyclable Paper/Kraft	2	0	0	14.4				9.4	
6		Non-recyclable Paper Products	2	0	0	15.0				10.0	
7	Plastic	PET Bottles (#1)	2	0	0	11.4				6.4	
8		PET Containers/Packaging (#1)	1	0	0	3.0				0.5	
9		HDPE Color (#2)	1	0	0	5.0				2.5	
10		HDPE Natural (#2)	1	0	0	3.0				0.5	

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Notes:

Recording the Data

Sample data entry spreadsheet setup

17		Non-Recyclable Glass	0	1	0		5.0			5.0
18	**Metals**	Ferrous Metal Containers	2	0	0	16.8				11.8
19		Aluminum Cans (UBC)	2	0	0	8.8				3.8
20		Other Metals	0	2	0		9.0			9.0
21	**Organics**	Food/Putrescible Waste	4	0	0	83.0				73.0
22		Compostable Fibers (Paper Towels, Etc.)	3	0	0	46.0				38.5
23		Other Organics	3	1	0	33.6	8.6			34.7
24	**Textiles**	Re-Usable Textiles	2	0	0	25.0				20.0
25		Non-recyclable Textiles	0	2	0		17.4			17.4
26		Leather & Rubber	1	0	0	6.2				3.7
27	**HHW**	Household Hazardous Waste	0	0	0					0.0
28	**Electronics**	All Electronics	0	2	0		20.2			20.2
29	**C&D**	Wood	0	2	0		7.8		6.2	14.0
30		Other C&D	1	2	0	5.8	5.4			8.7
31	**Other**	Fines	2	0	0	62.4				57.4
32		Diapers	0	3	0		33.4			33.4
33		Other Bulky or Composite Items	3	0	0	37.4				29.9
									Total	**477.99**

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Notes:

Analyzing the Data

- Determine the percentage of each material category within the stream – called a waste composition profile
  - Each sample
  - Each generating sector or source
  - Overall average
- **The total must equal 100%**

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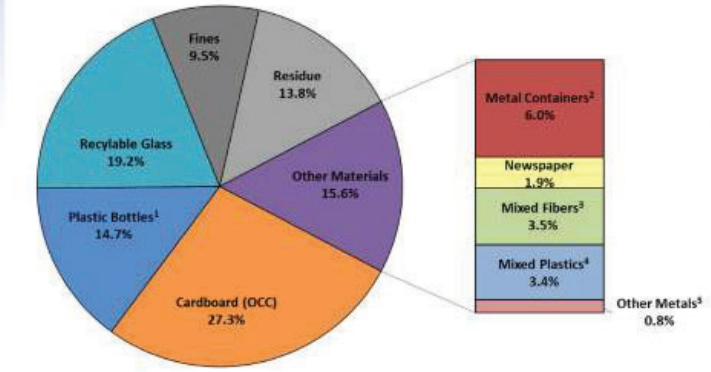
Notes:

Sample Composition Profile Pie Chart



(1) Plastic Bottles are #1 PET and #2 Color and Natural HDPE containers with discernable necks
(2) Metal Containers are Ferrous cans and UBC Aluminum Cans
(3) Mixed Fibers include Office Paper and Magazines, Kraft Paper, other Recyclable Paper and Gable Top Containers
(4) Mixed Plastics include #1 PET Clamshells, #3-#7 Mixed Plastics, And Bulky Rigid Plastics
(5) Other Metals is a mix of Fe, Al and other metals that are not containers
(6) Fines generally included 50% or greater glass

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Notes:

Analyzing the Data

- A basic understanding of statistical analysis is important in fully understanding the data collected
  - **Variance: measures the spread** of the data
    - A low variance means that the numbers tend to be very close to the average and to each other indicating a representative data set
    - A high variance means that the numbers tend to be spread out from the average and from each other potentially identifying an outlier data point

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Notes:

Analyzing the Data

- **Standard deviation**: a **measure of the amount of variation** (the deviation) of a set of values – similar to variance
  - A low standard deviation means that all the values in your set tends to be close the average value of the set
  - A high standard deviation means that the values in your set tend to be spread out over a wider range
  - **Advantage:** The unit of measure of the standard deviation is the same as the data set

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Notes:

Analyzing the Data

- **Skewness**: a measure of **how uniform the distribution of the set of values is around its mean** (the average value of the set)
  - A positive or negative skew to your data can be another indication of how consistent the material compositions are from one sample to the next

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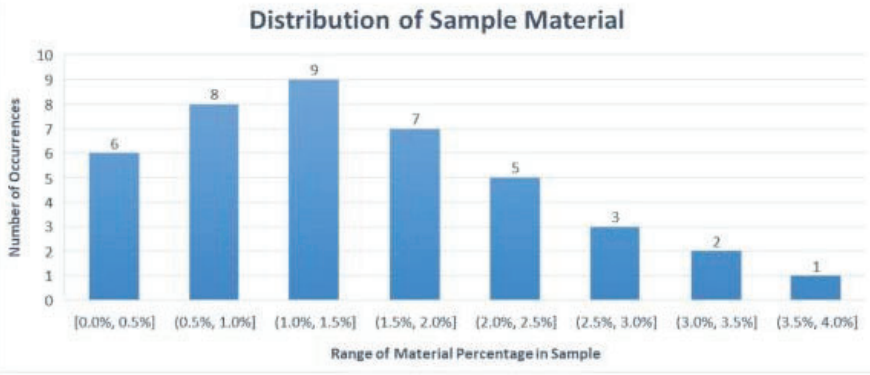
Notes:

Skewness Example



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Notes:

Analyzing the Data

- **Confidence Interval**: a **range of values that is likely to include the average value** of the set
  - Aim for **at least a 90% confidence interval** in your data – meaning that 9 out of 10 times you perform the sort, the mean will land within your **error range** (defined by what is known as the upper and lower confidence interval)

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Notes:

Analyzing the Data

- **Error Range or Error Bars:** a line or graphic shown in a chart or graph that represents how variable your data
  - Indicates the uncertainty, or "error," in the data reported
  - Gives a general idea of how precise your data is

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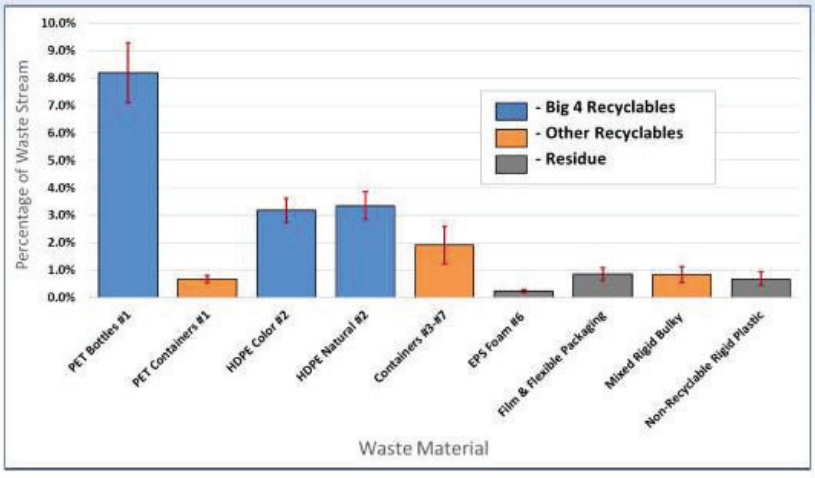
Notes:

Sample Composition Profile Bar Chart



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Notes:

Analyzing the Data

Getting help:

- Statistical analysis not your strong suit? Make a friend!
- The internet can also be your friend – many tutorial articles and videos exist online
- Most updated software programs include in-application help, as well as smart formulas that can guide you

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Notes:

Chapter 6 Review

1. Data record keeping includes good habits both during the sort and after the sort.
2. During the sort be sure to review raw data forms, take good notes, and identify any missing information
3. After the sort, transfer raw data along with any notes to a computer using spreadsheet software
4. Have your statistical analysis done by someone who is experienced and can help you interpret your results

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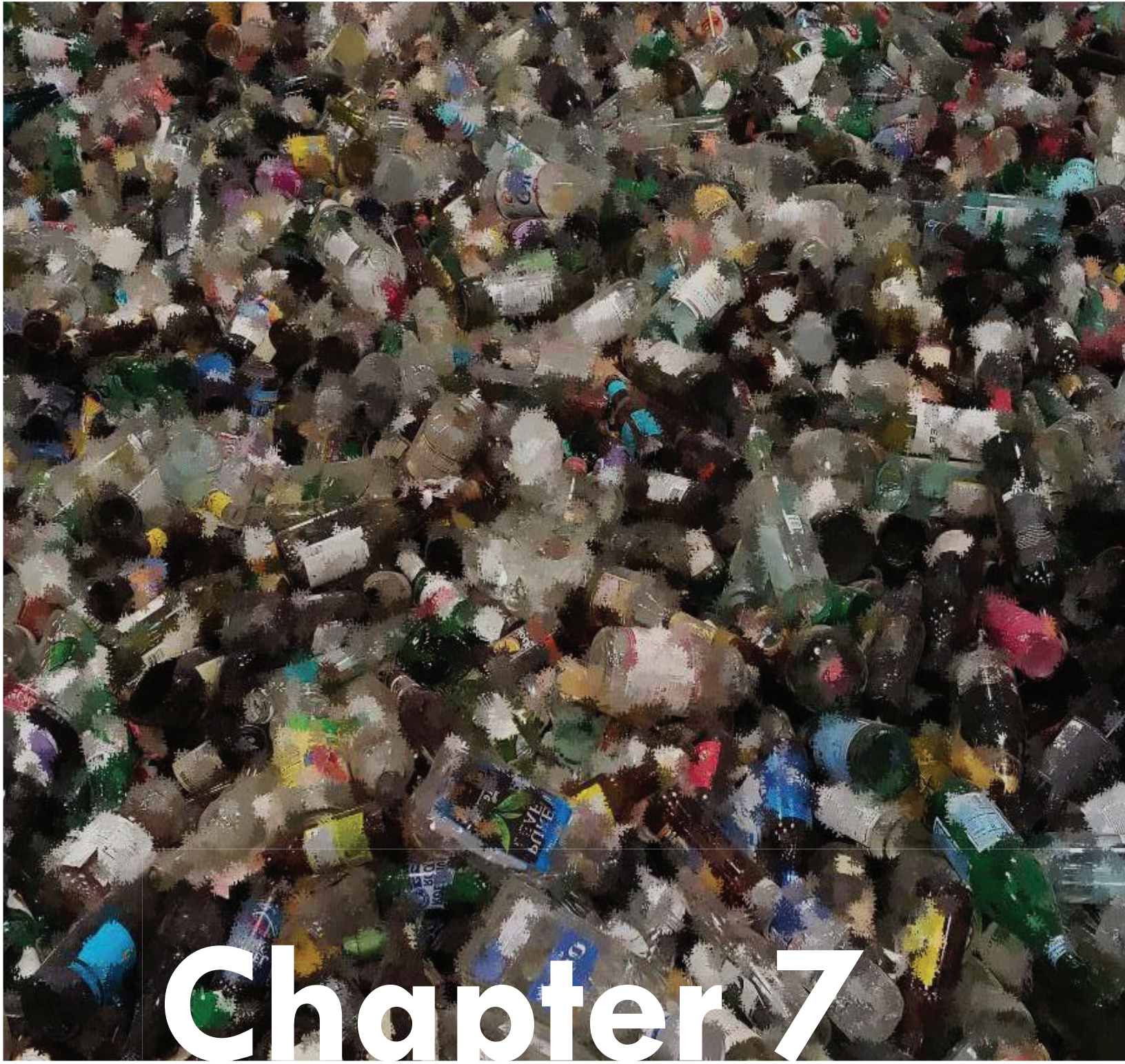
Notes:



Chapter 7

Utilizing Waste Sort Results

Chapter 7

The data from a waste sort will reveal important details about the materials that are in your tribe's waste stream. The data from a waste stream can be used for many purposes, including assessing the suitability of the waste stream for specific waste diversion and processing methods or technologies, building or improving programs and services, addressing recycling contamination, and developing long-term planning strategies. The data gained from a waste sort can also be used in grant applications to demonstrate a deeper understanding of your tribe's waste stream and present a data-driven need for program assistance.

Learning Objectives

Understand how to put the data you have gathered to work! Use it to understand:

1. *Types of materials disposed*
2. *Quantities of materials disposed*
3. *Waste stream suitability for specific waste diversion and processing methods or technologies*
4. *How to build or improve programs and services*
5. *Recycling contamination*
6. *Long-term planning strategies – incorporating Into an Integrated Waste Management Plan or grant application*

Data Use

- **Data = knowledge!**
- Use your waste sort to establish a baseline for your community and inform:
  - Program development
  - Diversion method selection
  - Infrastructure investment
  - Facility/program sizing
  - Determine need for future waste sorts

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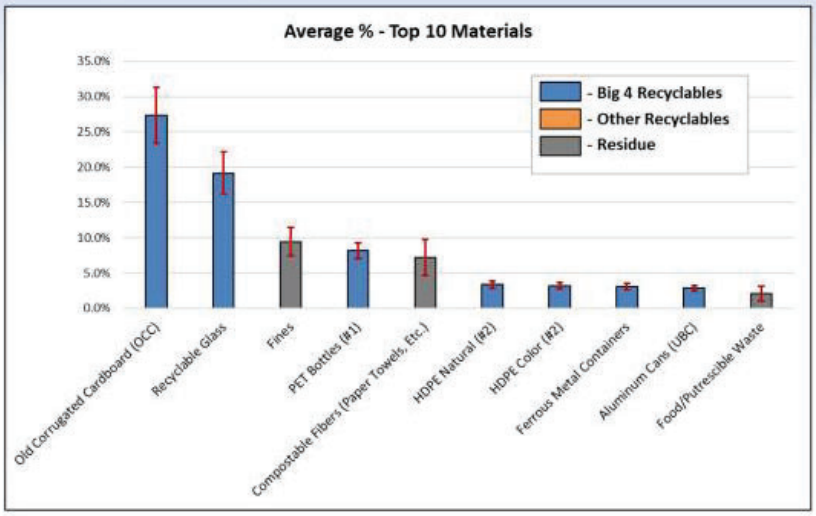
Notes:

Sample Top 10 Materials Bar Chart



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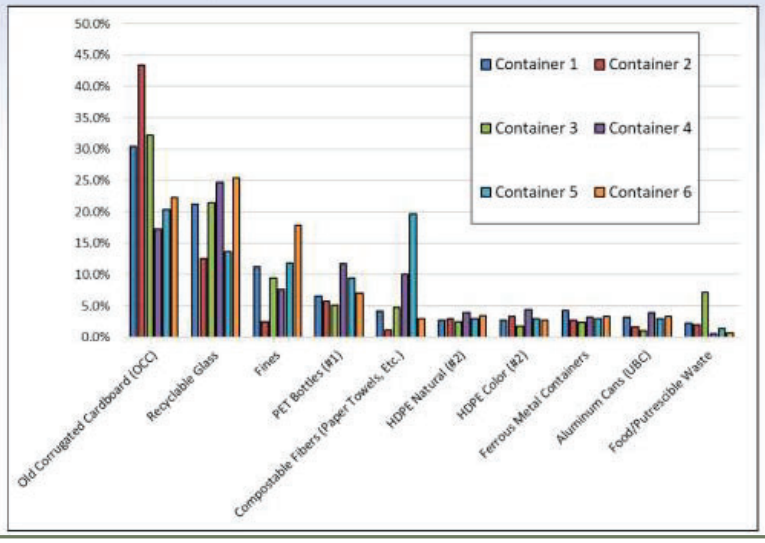
Notes:

Sample Top 10 Materials by Generator



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Notes:

Data Use

Other types of data use:

- Estimate material tonnages and potential for recycling or energy use
- Extend life of solid waste facility or program
- Determine recycling contamination/residue rates
- Understand how much of your waste stream is recoverable:
  - Recyclables
  - Reusable items
  - Compostable organic items

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Notes:

Example: Choctaw Nation of Oklahoma

- Choctaw Nation of Oklahoma (CNO) Headquartered in Durant, Oklahoma, with land across 10.5 counties
- Conducted an MSW waste sort over approximately 6 weeks in early 2019
  - 4 cities/towns
    - Atoka
    - Calera
    - Durant
    - McAlester

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Notes:

Example: Choctaw Nation of Oklahoma

  - 6 different generator types in Durant
    - Residential
    - Commercial
    - Casino (2)
    - Headquarters Building
    - Events Center
- Crew of **2-4 personnel** sorted **26,689 pounds** of materials into **25 categories**

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Notes:

Example: Choctaw Nation of Oklahoma

- Results of the waste sort were used to understand:
  - The **dollar value of recyclable materials** that were being disposed
  - Whether the material composition profile was appropriate for:
    - Anaerobic Digestion / Composting (quantity of organic material)
    - Production of Solid Fuel (energy value calculation of waste)
    - Combustion with Energy Recovery (energy value calculation of waste)

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Notes:

Choctaw Nation of Oklahoma 2019 Waste Composition Profile

Material Category	Material Type	Composition Percentage
Fiber	OCC	12.4%
	Other Paper	4.2%
	Shredded paper	0.3%
Plastic	PET (1)	3.8%
	HDPE (2) natural	0.6%
	HDPE (2) colored	0.6%
	PP (5)	0.6%
	Mixed Plastic (7) & other	1.9%
	Bags & Film	4.4%
Glass	Colored Glass	2.4%
	Clear Glass	1.6%
Metals	Non-Ferrous (tin)	1.2%
	Non-Ferrous (aluminum)	1.7%
	Non-Ferrous (other)	0.2%
	Ferrous	0.5%

Material Category	Material Type	Composition Percentage
Organics	Food	25.5%
	Leaves & Brush	1.9%
Textiles	Textiles	3.4%
HHW	Batteries	0.0%
	Printer Cartridges	0.0%
Electronics	All Electronics	0.7%
Other	C&D	1.0%
	Styrofoam	0.9%
	Other	0.0%
Residue	Residue	30.2%
	Total:	**100.0%**

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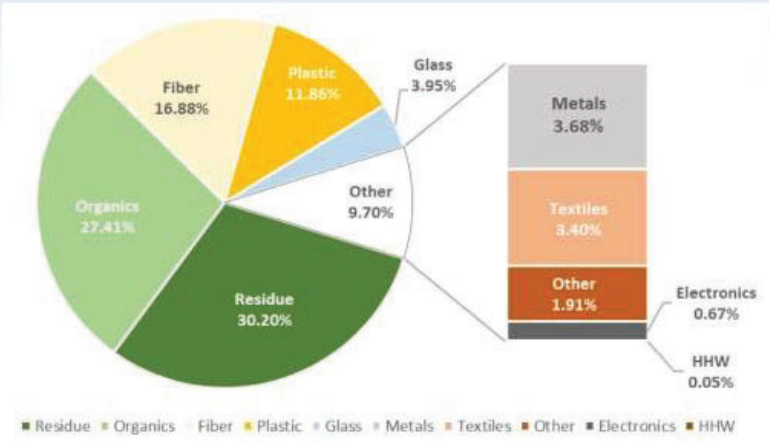
Notes:

Choctaw Nation of Oklahoma
2019 Waste Composition Profile



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Notes:

CNO 2019 Waste Diversion Analysis

Material Category	Material Type	Composition Percentage	Currently Recycled	% Currently Recycled	Could be Recycled	% Could be Recycled	Could be Composted	% Could be Composted
Fiber	OCC	12.4%	Y	12.42%	Y	12.42%	N	0.00%
	Other Paper	4.2%	Y	4.17%	Y	4.17%	N	0.00%
	Shredded paper	0.3%	Y	0.28%	Y	0.28%	N	0.00%
Plastic	PET (1)	3.8%	Y	3.81%	Y	3.81%	N	0.00%
	HDPE (2) natural	0.6%	Y	0.56%	Y	0.56%	N	0.00%
	HDPE (2) colored	0.6%	Y	0.59%	Y	0.59%	N	0.00%
	PP (5)	0.6%	Y	0.63%	Y	0.63%	N	0.00%
	Mixed Plastic (7) & other	1.9%	N	0.00%	Y	1.88%	N	0.00%
	Bags & Film	4.4%	Y	4.38%	Y	4.38%	N	0.00%
Glass	Colored Glass	2.4%	N	0.00%	Y	2.38%	N	0.00%
	Clear Glass	1.6%	N	0.00%	Y	1.57%	N	0.00%
Metals	Non-Ferrous (tin)	1.2%	Y	1.22%	Y	1.22%	N	0.00%
	Non-Ferrous (aluminum)	1.7%	Y	1.75%	Y	1.75%	N	0.00%
	Non-Ferrous (other)	0.2%	N	0.00%	Y	0.16%	N	0.00%
	Ferrous	0.5%	N	0.00%	Y	0.54%	N	0.00%
Organics	Food	25.5%	N	0.00%	N	0.00%	Y	25.49%
	Leaves & Brush	1.9%	N	0.00%	N	0.00%	Y	1.91%
Textiles	Textiles	3.4%	N	0.00%	Y	3.40%	N	0.00%
HHW	Batteries	0.0%	N	0.00%	N	0.00%	N	0.00%
	Printer Cartridges	0.0%	Y	0.03%	Y	0.03%	N	0.00%
Electronics	All Electronics	0.7%	N	0.00%	N	0.00%	N	0.00%
Other	C&D	1.0%	N	0.00%	N	0.00%	N	0.00%
	Styrofoam	0.9%	Y	0.88%	N	0.00%	Y	0.88%
	Other	0.0%	N	0.00%	Y	0.03%	N	0.00%
Residue	Residue	30.2%	N	0.00%	N	0.00%	N	0.00%
	Total:	100.0%		30.7%		39.8%		28.3%

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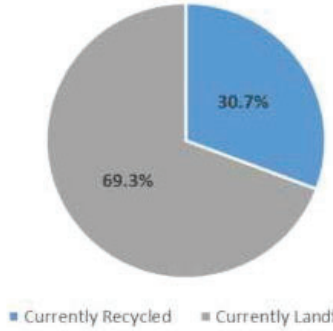
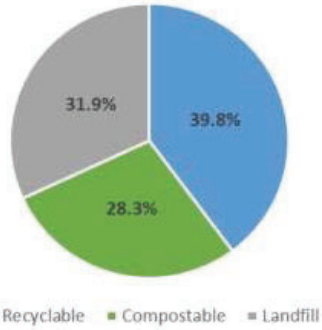
Notes:

Choctaw Nation of Oklahoma
2019 Waste Diversion Analysis

2019 Waste & Recycling Methods



Potential Waste Diversion Opportunities



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Notes:

Choctaw Nation of Oklahoma
2019 Value of Recycling in Waste

Material Category	Material Type	Composition Percentage	Recycling Market Value per Ton (as of Q1 2019)	Value of Recyclables per Ton of Waste
Fiber	OCC	12.42%	$ 88.00	$ 10.93
	Other Paper	4.17%	$ 21.00	$ 0.88
	Shredded paper	0.28%	$ 206.00	$ 0.59
Plastic	PET (1)	3.81%	$ 300.00	$ 11.44
	HDPE (2) natural	0.56%	$ 485.00	$ 2.73
	HDPE (2) colored	0.59%	$ 305.00	$ 1.79
	PP (5)	0.63%	$ 240.00	$ 1.52
	Bags & Film	4.38%	$ 10.00	$ 0.44
Metals	Non-Ferrous (tin)	1.22%	$ 174.00	$ 2.13
	Non-Ferrous (aluminum)	1.75%	$ 1,267.00	$ 22.17
HHW	Printer Cartridges	0.03%	$ -	$ -
Other	Styrofoam	0.88%	$ 100.00	$ 0.88
	Total:	**30.74%**		**$ 55.49**

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Notes:

Data Use

Track progress of programs and services over time by comparing results across multiple years

- Note that it is important to maintain consistent processes, strategies, and material categories **each time you conduct a sort** in order for the data from one sort to be comparable to another

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Notes:

Sample Data Comparison Chart Over Multiple Years

2017	2011	2005	1998
Food Waste[1] 20.0%	Food Waste 13.3%	Food Waste 10.6%	Food Waste 10.7%
Plastic Film[2] 8.7%	OCC & Kraft Paper 9.0%	OCC & Kraft Paper 8.5%	Non-Rec. Paper[4] 10.3%
Compostable Paper 7.6%	Plastic Film[2] 6.7%	Mixed Rec. Paper 7.0%	OCC & Kraft Paper 8.5%
Mixed Rec. Paper 6.1%	Compostable Paper 6.1%	Plastic Film[2] 6.6%	Other Plastic Products 7.5%
OCC & Kraft Paper[3] 4.6%	Untreated Wood 5.4%	Compostable Paper 6.5%	Mixed Rec. Paper 5.4%
TOTAL PROPORTION OF TOP 5 MATERIALS			
47.0%	40.5%	39.2%	42.4%

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Notes:

Data Use Review

- **Understanding your waste stream is the backbone of a good Waste Management Plan**
- The data gained from a waste sort can also be used in grant applications, to demonstrate that **you have done your homework in understanding your waste stream** and how receiving the grant will help you accomplish your goals

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Notes:

Chapter 7 Review

1. Fundamentally, the data from a waste sort tells you how much and what types of materials are in your waste stream.
2. The data from a waste stream can be used for many additional purposes, including:
   a. Assessing the suitability of the waste stream suitability for specific waste diversion and processing methods or technologies
   b. Building or improve programs and services
   c. Addressing recycling contamination
   d. Developing long-term planning strategies – incorporating into an Integrated Waste Management Plan or grant application

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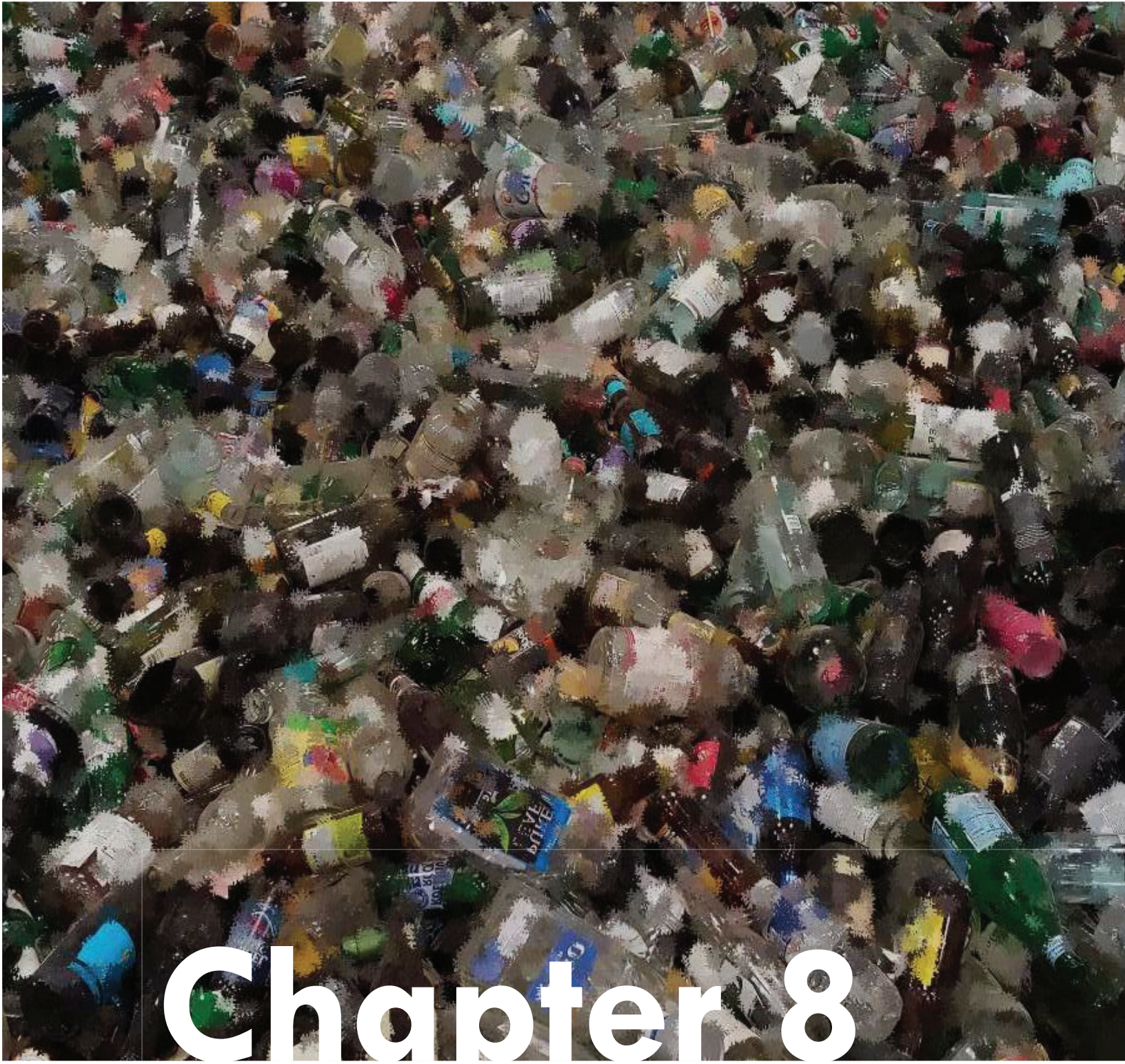
Notes:



Chapter 8

Opportunities for Collaboration

Chapter 8

Waste assessments can be used as a platform to collaborate and communicate with partners and individuals within your community. The waste assessment process can become a springboard to build relationships and strengthen connections with key decision makers that impact solid waste programming. Taking ownership of the waste generated in your community can create jobs, save money, and gain revenue while improving the health of your community and the environment.

Learning Objectives

1. *Understand how waste and recycling span multiple industries*
2. *Understand the value of taking ownership over your waste stream and creating additional relationship connections within your Tribe*
3. *Understand the importance of partnerships*
4. *Identify potential collaboration opportunities within the Tribe*
5. *Considerations for other partnerships*

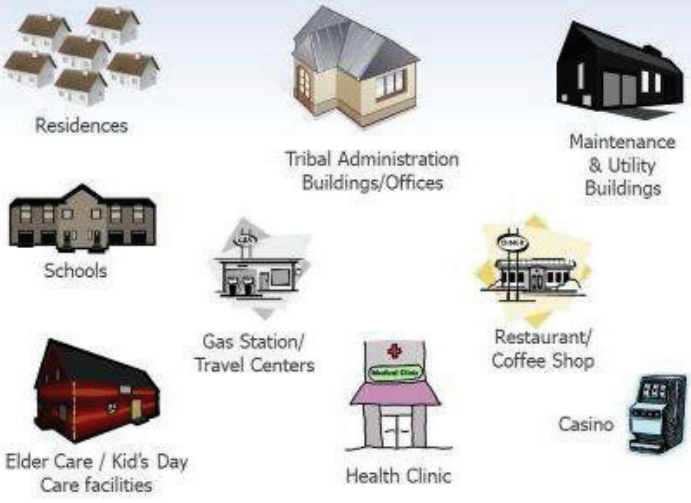
Opportunities for Collaboration

Who manages waste in your community?

- Waste sorts can be a great platform to encourage multiple departments to collaborate and take an interest in how waste is managed in your community.
  - Consider involving the following departments in planning and communicate results: healthcare, utilities, water departments, local businesses, and schools
- This process can become a springboard to build relationships and strengthen connections with key decision makers.
  - Make sure to brief tribal leadership of all phases of the waste sort, especially findings!

Notes:

Opportunities for Collaboration



Notes:

Opportunities for Collaboration

Potential Local Partnerships:

Local partnerships can be powerful in terms of economic/community development & achieving measurable results:

- Schools/colleges/universities
  - Education & vocational training
- Agricultural & local food producers
  - Can provide both a waste source and an end market for compost and other products

Notes:

Opportunities for Collaboration

Other potential local partnerships:

- Local utilities (energy, electricity, and waste)
- Other tribes & tribal entities
- City and county governments and their facilities and/or private contractors
- Popular public places or commercial entities
  - Can provide convenient drop-off locations

Notes:

Opportunities for Collaboration

Potential Federal Partnerships:

- EPA
- IHS
- BIA
- USDA
- HUD
- Mentoring with other tribes
- Pollution Prevention Institutes

Notes:

Opportunities for Collaboration

EPA Peer Matching Program:

- Goal is to strengthen tribal capacity and develop sustainable waste management programs
- Open to all tribes and Alaska Native Villages
- Match with tribes and Alaska Native Villages who are working on similar issues to exchange experiences and practical knowledge

NATIONAL TRIBAL WASTE MANAGEMENT PEER MATCHING PROGRAM

Notes:

Opportunities for Collaboration

Tribal Waste Management Technical Assistance Directory:
Provides information on both national and regional-specific assistance available to tribes.

Region & Organization	Technical Assistance	Monitoring Programs	Source Reduction Trainings	Solid Waste Management Trainings	Tribal Hazardous Substances	Websites & Online Resources	Conferences & Forums	Planning Templates
NATIONWIDE								
Department of Housing and Urban Development (HUD) Office of Native American Programs (ONAP)	✓			✓		✓	✓	
Environmental Protection Agency (EPA): Office of Resource Conservation and Recovery (ORCR)	✓	✓				✓		
Indian Health Service (IHS)/Environmental Protection Agency (EPA)	✓			✓		✓		
Indian Health Service – Division of Sanitation Facilities Construction (DSFC) and Environmental Health Support Center (EHSC)	✓			✓		✓		
Institute for Tribal Environmental Professionals (ITEP)	✓	✓	✓	✓	✓	✓	✓	
National Congress of American Indians (NCAI)					✓	✓	✓	

EPA.gov/tribal-lands/tribal-waste-management-technical-assistance-directory

Notes:

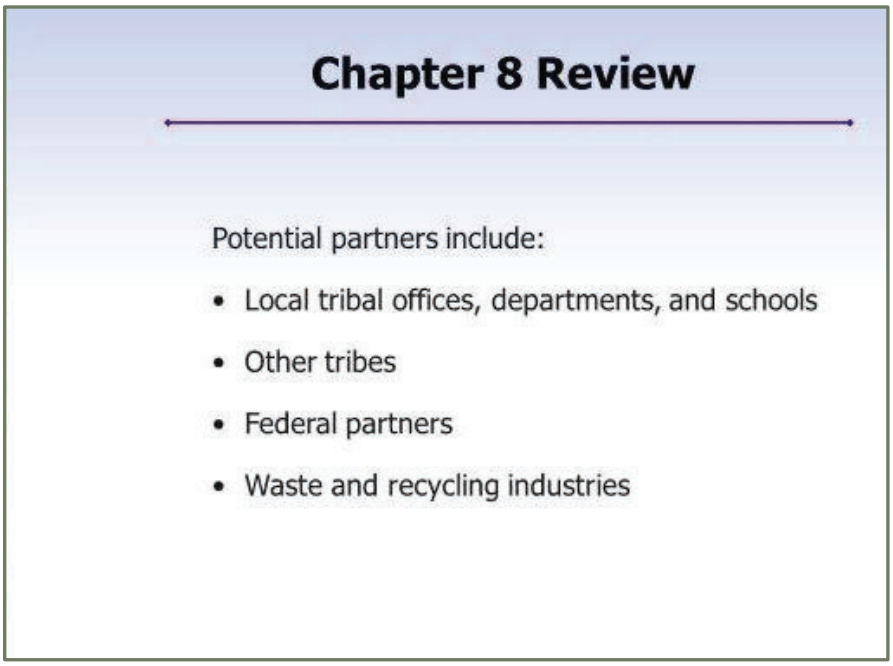
Opportunities for Collaboration

Waste & Recycling Industries:

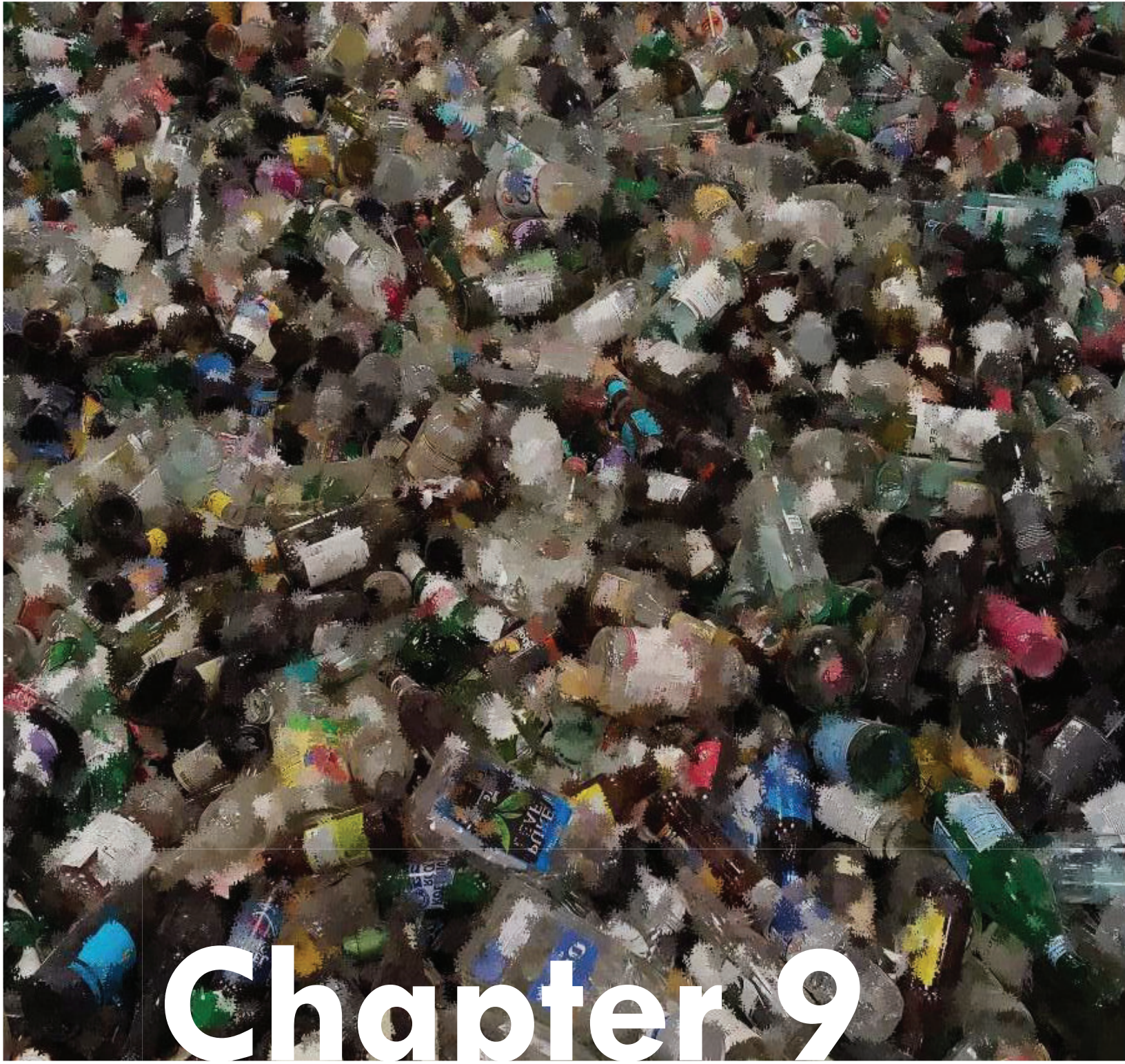
Waste- and recycling-related activities can cross over into other related industries

- Example: Organics management (composting) can work well with agriculture and food production activities
  - Education and vocational training tie in well
  - Economic and job development
  - Water resource management

Notes:


Chapter 8 Review
Potential partners include:
• Local tribal offices, departments, and schools
• Other tribes
• Federal partners
• Waste and recycling industries

Notes:



Chapter 9

Funding & Assistance Resources

Chapter 9

A resilient solid waste project or program will be self-sustainable, using revenues or fees to cover operating costs. Many resources exist for tribes to secure external funding or technical assistance to start or expand a solid waste program or project. Resources can be generally classified as private, such as debt or equity, or public, including grants, loans, and tax credits.

Learning Objectives

1. How to leverage funding and assistance resources

2. Understanding of different types of funding assistance and resources

3. How to search for funding assistance and resources

4. Examples of current funding opportunities

Funding & Assistance Resources

Leveraging Funding & Assistance Resources

- Over the long-term, a successful project or program will be self-sustainable, using revenues or fees to cover costs
- To get a project or program started, many resources exist for Tribes to secure outside funding or technical assistance
- Resources can be generally classified as:
  - Private
  - Public

Notes:

Funding & Assistance Resources

Potential Funding & Assistance Sources for a Tribal Project Could Include:

- Public Sources
  - Grants (Federal, State)
  - Loans and loan guarantees (Federal, State)
  - Tax credits (Federal)
  - Technical support (Federal)
  - Other incentives & support (Federal, State, Private/Non-profit)
- Sources may be **"Direct"** (funding/assistance provided directly to Tribe) or **"Indirect"** (funding/ assistance provided to another entity but ultimately benefits the Tribe)

Notes:

Searching for Funding & Assistance Resources

- Internal funding opportunities
- Online searches
  - Grants.gov!
- Regional EPA Representative
- Inquire with other Tribes

Notes:

Funding & Assistance Resource

Partner Organization Considerations

Financial benefits & incentives available for a business entity on tribal land may include:

- Historically Under-Utilized Business Zone (HUBZone)
- Immigrant Investor/EB-5 Visas Program
- Tribal Economic Development Bonds
- Federal and State Tax Exemptions (can include income and property tax)
- Federal Tax Credits in Opportunity Zones
- Accelerated Depreciation (twice the normal rate when the item/facility is on tribal land)
- Federal Government Contracting Preferences

Notes:

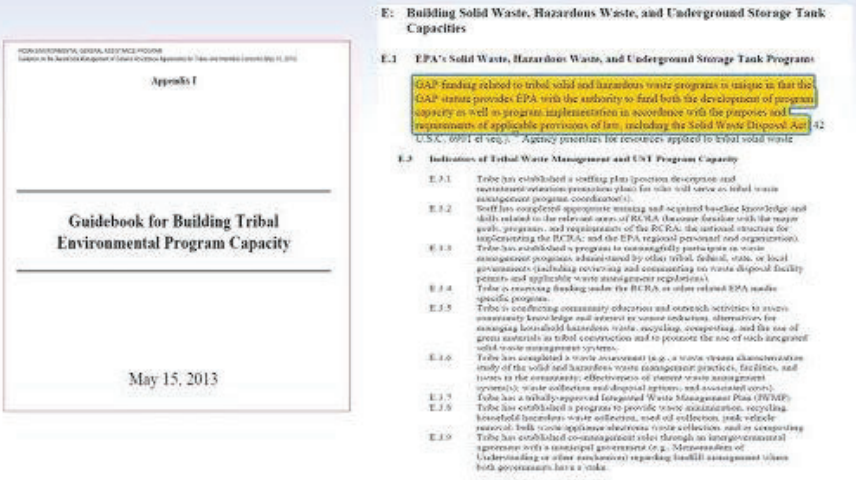
Funding & Assistance Resources

Direct Federal Funding – Grant Opportunities:

- Indian Environmental General Assistance Program (GAP)
  - Funded by U.S. Environmental Protection Agency
  - Awards range from $75,000 to $400,000
  - Provides grant funding for tribal government capacity and participation in administering environmental regulatory programs, including tribal solid and hazardous waste program development and implementation
  - May include technical assistance
  - Website: https://www.epa.gov/grants/multipurpose-grants-states-and-tribes

Notes:

Funding & Assistance Resources



Appendix I

Guidebook for Building Tribal Environmental Program Capacity

May 15, 2013

E: Building Solid Waste, Hazardous Waste, and Underground Storage Tank Capacities

E.1 EPA's Solid Waste, Hazardous Waste, and Underground Storage Tank Programs

GAP funding related to tribal solid and hazardous waste programs is unique in that the GAP statute provides EPA with the authority to fund both the development of program capacity as well as program implementation in accordance with the purposes and requirements of applicable provisions of law, including the Solid Waste Disposal Act (42 U.S.C. 6901 et seq.). Agency priorities for resources applied to tribal solid waste

E.2 Indicators of Tribal Waste Management and UST Program Capacity

E.2.1 Tribe has established a staffing plan (position descriptions and recruitment/retention procedures plan) for roles will serve as tribal waste management program coordinator(s).

E.2.2 Staff has completed appropriate training and acquired baseline knowledge and skills related to the relevant areas of RCRA (because familiar with the major goals, programs, and requirements of the RCRA; the national structure for implementing the RCRA; and the EPA regional personnel and organization).

E.2.3 Tribe has established a program to meaningfully participate in waste management programs administered by other tribal, federal, state, or local governments (including reviewing and commenting on waste disposal facility permits and applicable waste management regulations).

E.2.4 Tribe is receiving funding under the RCRA or other related EPA media specific program.

E.2.5 Tribe is conducting community education and outreach activities to assess community knowledge and interest in source reduction, alternatives for managing household hazardous waste, recycling, composting, and the use of green materials in tribal construction and to promote the use of such integrated solid waste management systems.

E.2.6 Tribe has completed a waste assessment (e.g., a waste stream characterization study of the solid and hazardous waste management practices, facilities, and issues in the community; effectiveness of current waste management system(s); waste collection and disposal options; and associated costs).

E.2.7 Tribe has a tribally-approved Integrated Waste Management Plan (IWMP).

E.2.8 Tribe has established a program to provide waste minimization, recycling, household hazardous waste collection, used oil collection, junk vehicle removal, bulk waste/appliance clean-out/waste collection, and/or composting.

E.2.9 Tribe has established co-management roles through an intergovernmental agreement with a municipal government (e.g., Memorandum of Understanding or other mechanism) regarding landfill management where both governments have a stake.

Notes:

Funding & Assistance Resources

Solid Waste Capacity building under GAP:

- Development of ISWMP
- Development of staffing plan
- RCRA and other SW trainings for environmental staff
- Waste characterization assessment
- Development of Solid waste facility/feasibility plan
- Development of waste management/ UST laws, codes & regulations
- Development of enforcement plan

Notes:

Funding & Assistance Resources

Direct Federal Funding – Grant Opportunities:

- Environmental Education Grants Program
  - Funded by U.S. Environmental Protection Agency
  - Awards vary
  - Provides funding for environmental education projects that promote environmental awareness and stewardship and help provide people with the skills to take actions that protect the environment
  - Requires a 25% match and that 25% of EPA funding be used to fund sub-awardees
  - Website: https://www.epa.gov/environmentaljustice/environmental-justice-small-grants-program

Notes:

Funding & Assistance Resources

Direct Federal Funding – Grant Opportunities:

- Environmental Justice Small Grants Program
  - Funded by U.S. Environmental Protection Agency
  - Funds projects up to $30,000
  - Provides funding that supports and empowers communities working on solutions to local environmental and public health issues
  - Projects can fall into several categories, including Clean Air, Clean Water, and Solid Waste Disposal
  - Website: https://www.epa.gov/environmentaljustice/environmental-justice-small-grants-program

Notes:

Funding & Assistance Resources

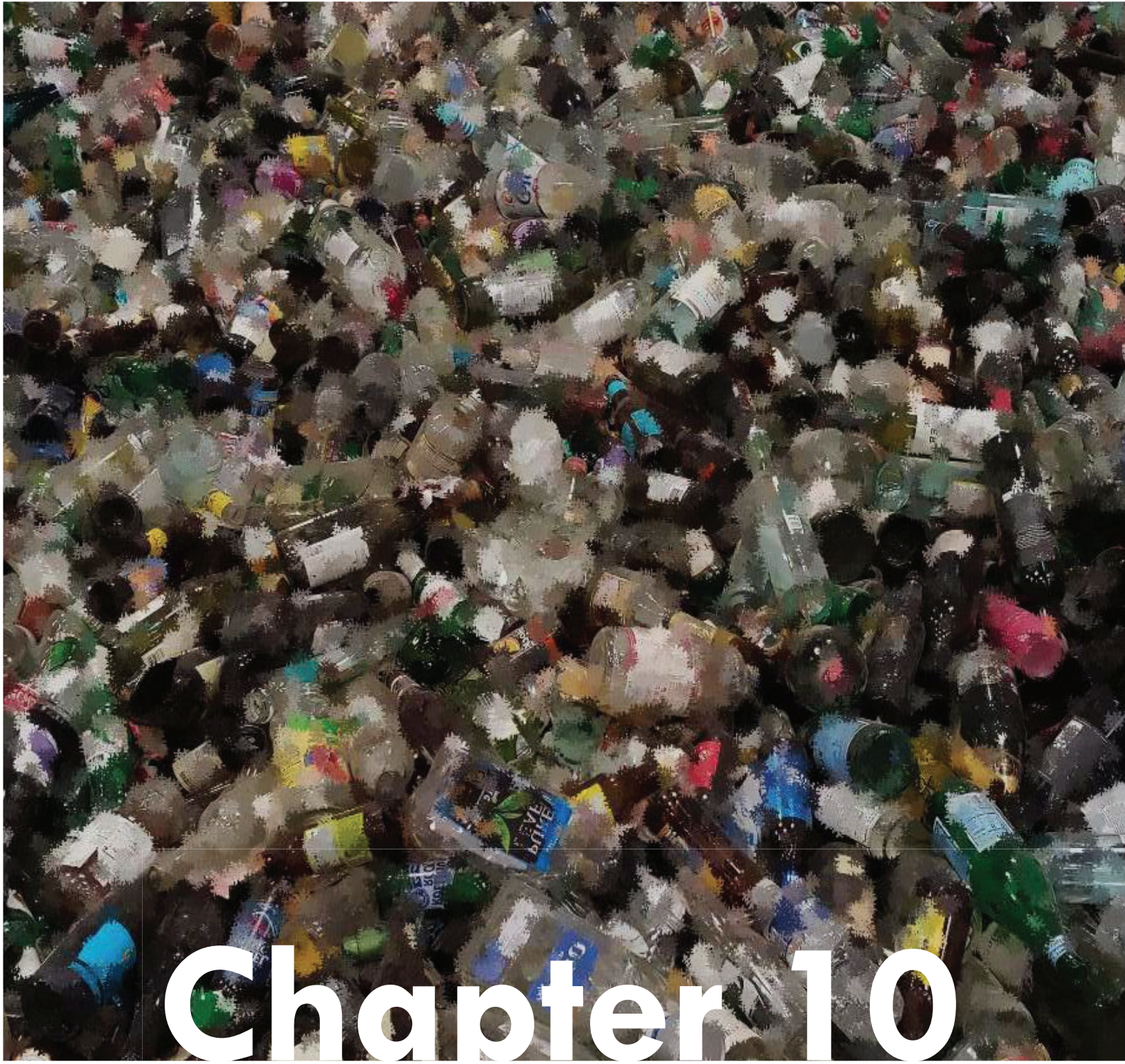
Direct Federal Funding – Grant Opportunities:

- Multipurpose Grant (MPG) Program for States and Tribes
  - Funded by U.S. Environmental Protection Agency
  - Awards vary
  - Provides flexible, multipurpose funding for high-priority activities to complement activities funded under established environmental statutes
  - Eligibility may vary depending on Tribes that have been delegated federal regulatory authority or are approved to operate certain regulatory programs
  - Website: https://www.epa.gov/grants/multipurpose-grants-states-and-tribes

Notes:


Funding & Assistance Resources
Other Assistance – Misc. Federal Programs:
The Office of Land and Emergency Management (OLEM) Grants and Funding
As part of the U.S. Environmental Protection Agency, OLEM administers a variety of grant programs that may vary from year to year
Grant categories typically include those related to brownfields, workforce training, hazardous waste management, and other waste management capacity building
Some grants are specific to Tribes
Website: https://www.epa.gov/grants/office-land-and-emergency-management-grants-and-funding

Notes:



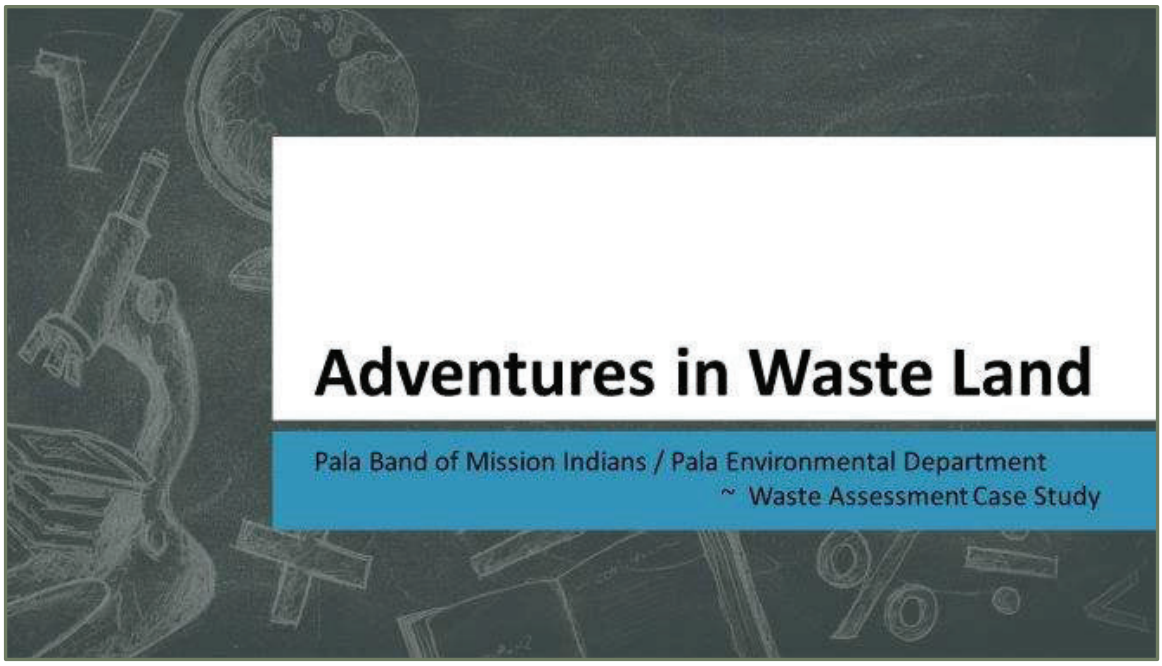
Chapter 10

Pala Band of Mission Indians' Waste Sort

Chapter 10

Heidi Brow has been the Water Resource Specialist for the Pala Band of Mission Indians (San Diego, CA) since 2005. She oversees the tribe's water resource program, including water quality monitoring and drinking water programs, grant management, developing water-related reports for the tribe, conducting regular outreach to both the tribal community and watershed-wide outreach, working on tribal youth science programing, and a variety of different water-conservation implementation programs. Additionally, she has worked on several of the tribe's climate change efforts, including reports, planning, and outreach with the Climate Science Alliance. She has also served as a board member (Secretary/Treasurer) for the San Luis Rey Watershed Council since 2009. She currently oversees most of their reporting, social media/website and general outreach, and helps with their grant management.

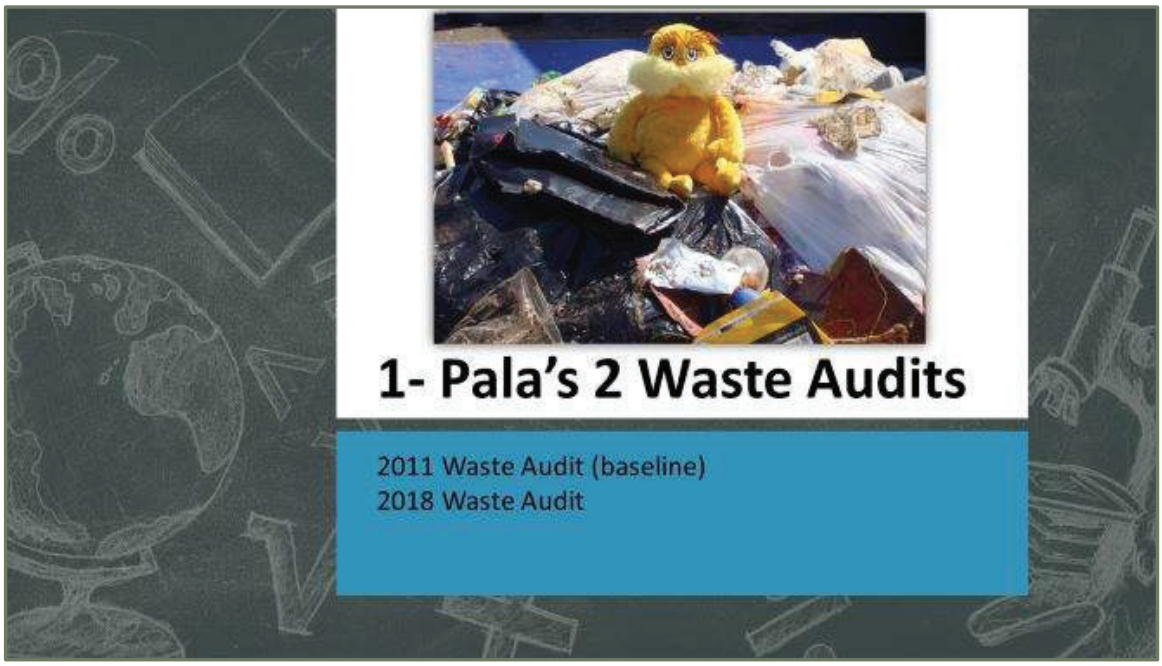
Alexis Wallick has been the Assistant Tribal Historic Preservation Officer (THPO) for the Pala Band of Mission Indians (San Diego, Ca) since 2009. She attends to the daily operation of the THPO program by responding to requests for cultural consultations and staying up to date on projects that are important to Pala. In 2017, she began managing the tribe's hazardous waste grant and implementing a curbside household hazardous waste collection program. She also acts as an environmental technician by helping out the other environmental programs when needed. Additionally, she regularly conducts outreach to the tribal community on a myriad of different environmental programs.


Adventures in Waste Land
Pala Band of Mission Indians / Pala Environmental Department
~ Waste Assessment Case Study

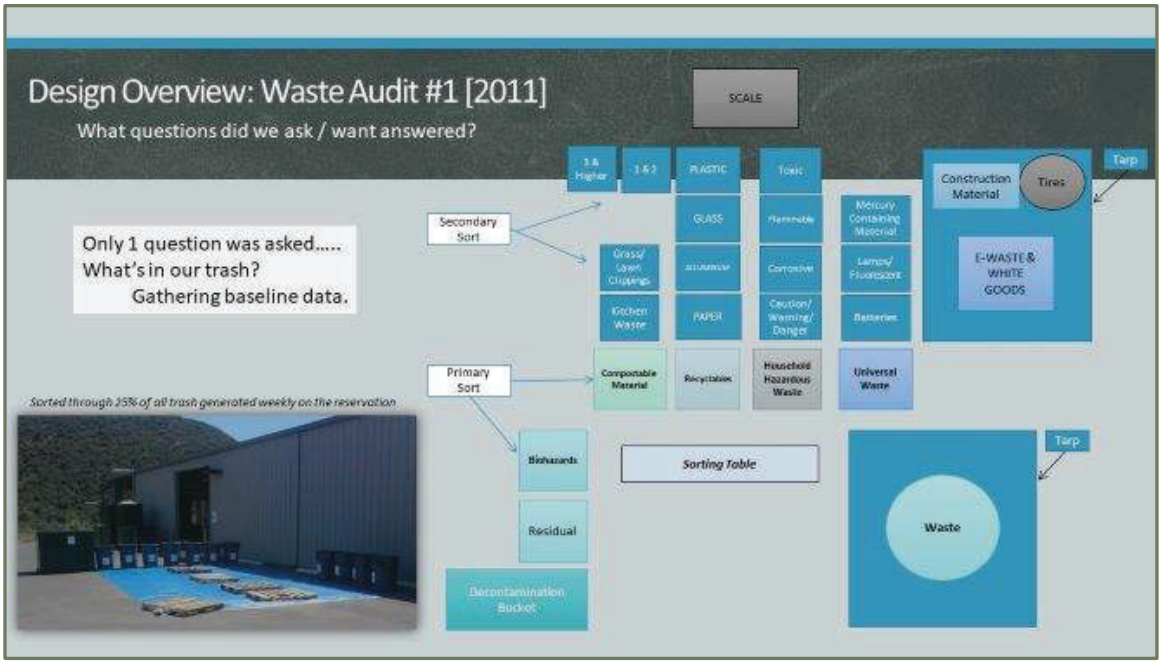
Notes:


Timeline: Pala's Solid Waste Program
Started Mulch (composting) Program
2009
Mattie Bluelegs Case Decision to close open dumps by 1997
Closed Open Dump
(opened 1970's)
1997
Opened Transfer Station
May 2008
Curbside Recycling Pilot
May 2018
HHW Curbside Pilot
July 2018
Wrote Solid Waste Management Plan
2005
Waste Audit #1
2011
Waste Audit #2
2018
HHUMP Updated
2019
2

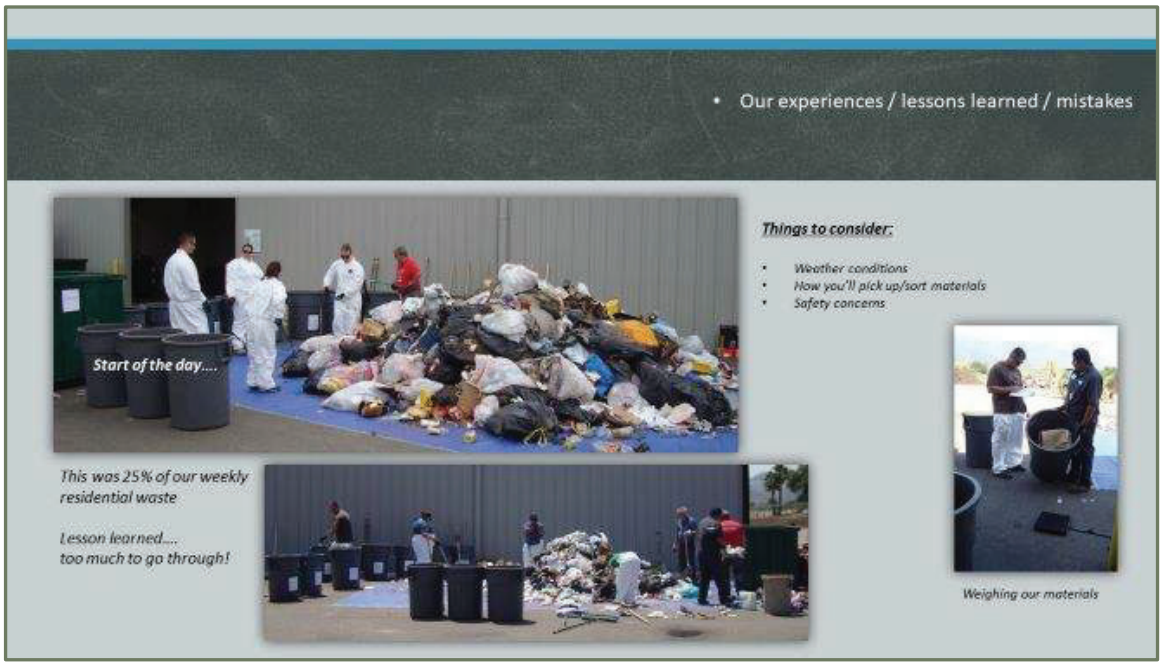
Notes:


1- Pala's 2 Waste Audits
2011 Waste Audit (baseline)
2018 Waste Audit

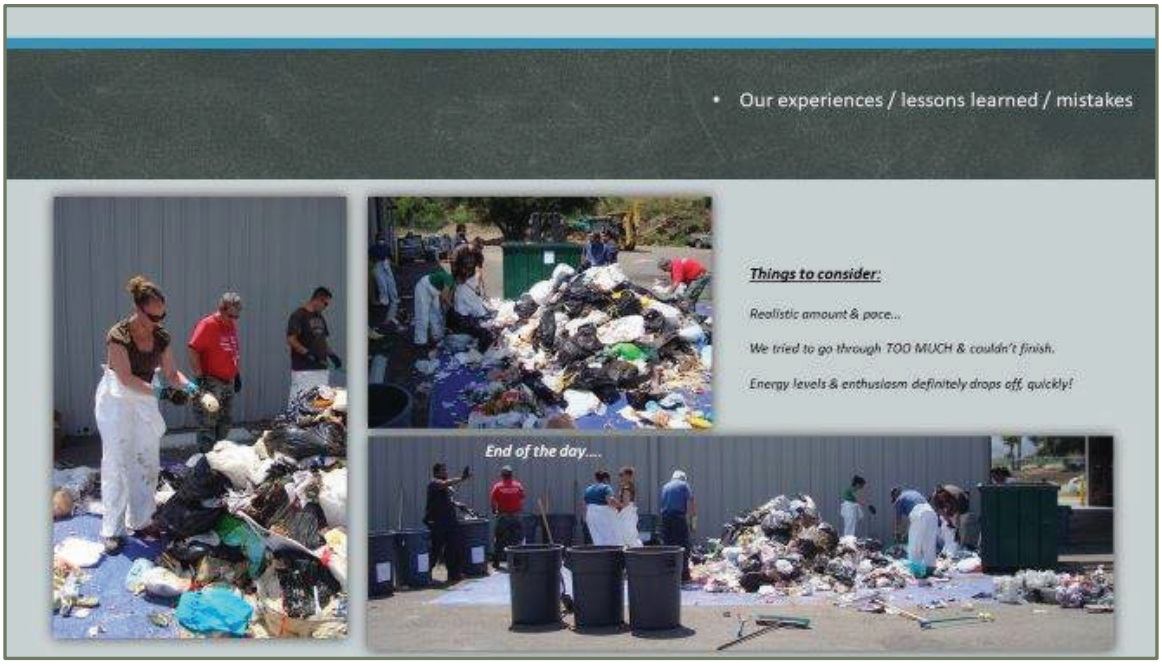
Notes:


Design Overview: Waste Audit #1 [2011]
What questions did we ask / want answered?
SCALE
Only 1 question was asked.....
What's in our trash?
Gathering baseline data.
Secondary Sort
Primary Sort
1 & Higher
1 & 2
PLASTIC
Toxic
GLASS
PAPER
Grass/ Lawn Clippings
Kitchen Waste
Flammable
Corrosive
Caution/ Warning/ Danger
Mercury Containing Material
Lamps/ Fluorescent
Batteries
Construction Material
Tires
Tarp
E-WASTE & WHITE GOODS
Compostable Material
Recyclables
Household Hazardous Waste
Universal Waste
Sorted through 15% of all trash generated weekly on the reservation
Biohazards
Residual
Decontamination Bucket
Sorting Table
Waste
Tarp

Notes:


• Our experiences / lessons learned / mistakes
Start of the day....
Things to consider:
• Weather conditions
• How you'll pick up/sort materials
• Safety concerns
This was 25% of our weekly residential waste
Lesson learned.... too much to go through!
Weighing our materials

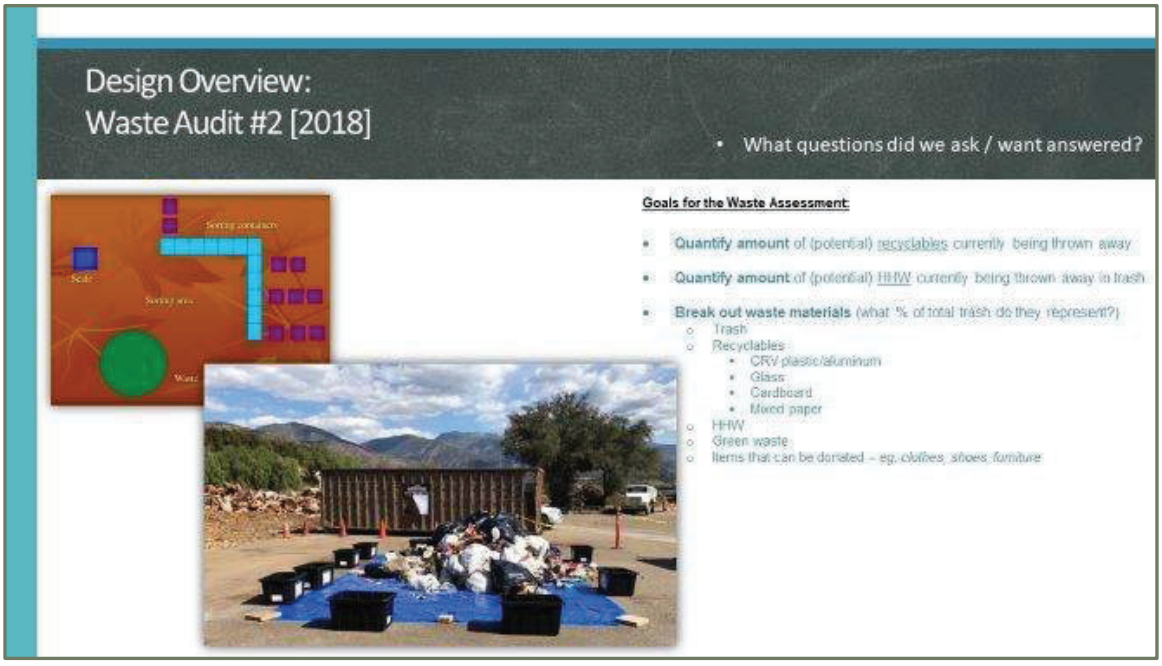
Notes:


• Our experiences / lessons learned / mistakes
Things to consider:
Realistic amount & pace...
We tried to go through TOO MUCH & couldn't finish.
Energy levels & enthusiasm definitely drops off, quickly!
End of the day....

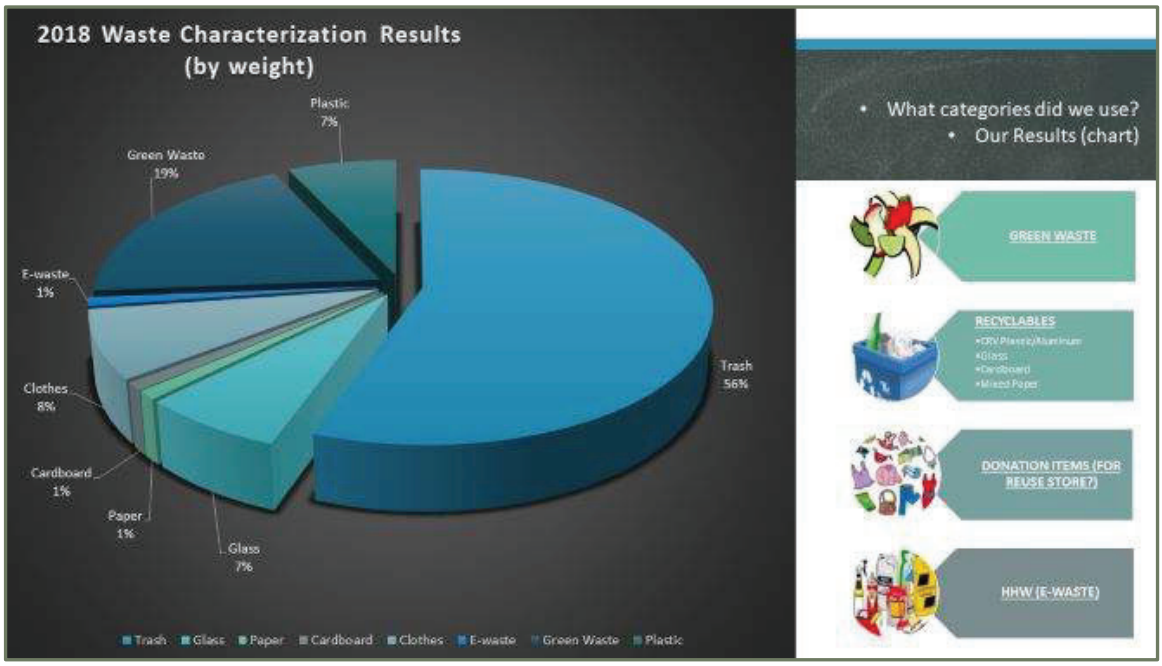
Notes:


• Interesting Finds....or *something* like that
1. Unopened toys and electronic equipment
2. Unopened soda cans, beer bottles, water bottles, and soda bottles
3. A lot of good cloths and shoes that could have been donated
4. A good amount of electronic waste
5. A few cell phones
6. Unopened packs of cigarettes
7. Unopened nutritional supplements
8. A bunch of stuffed animals
9. Did not find much aluminum
10. Quite a bit of compostable food waste

Notes:


Design Overview:
Waste Audit #2 [2018]
• What questions did we ask / want answered?
Goals for the Waste Assessment:
• Quantify amount of (potential) recyclables currently being thrown away
• Quantify amount of (potential) HHW currently being thrown away in trash
• Break out waste materials (what % of total trash do they represent?)
o Trash
o Recyclables
▪ CRV plastic/aluminum
▪ Glass
▪ Cardboard
▪ Mixed paper
o HHW
o Green waste
o Items that can be donated – eg. clothes, shoes, furniture

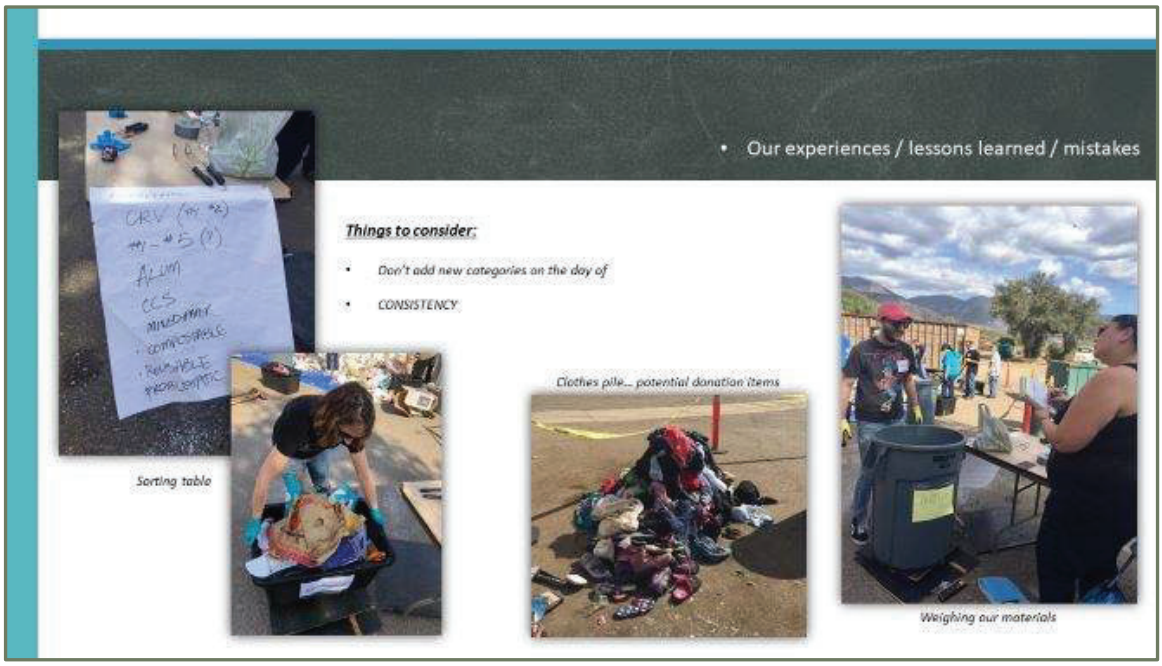
Notes:


2018 Waste Characterization Results
(by weight)
Plastic
7%
Green Waste
19%
E-waste
1%
Clothes
8%
Cardboard
1%
Paper
1%
Glass
7%
Trash
56%
Trash
Glass
Paper
Cardboard
Clothes
E-waste
Green Waste
Plastic
• What categories did we use?
• Our Results (chart)
GREEN WASTE
RECYCLABLES
DONATION ITEMS (FOR REUSE STORE?)
HHW (E-WASTE)

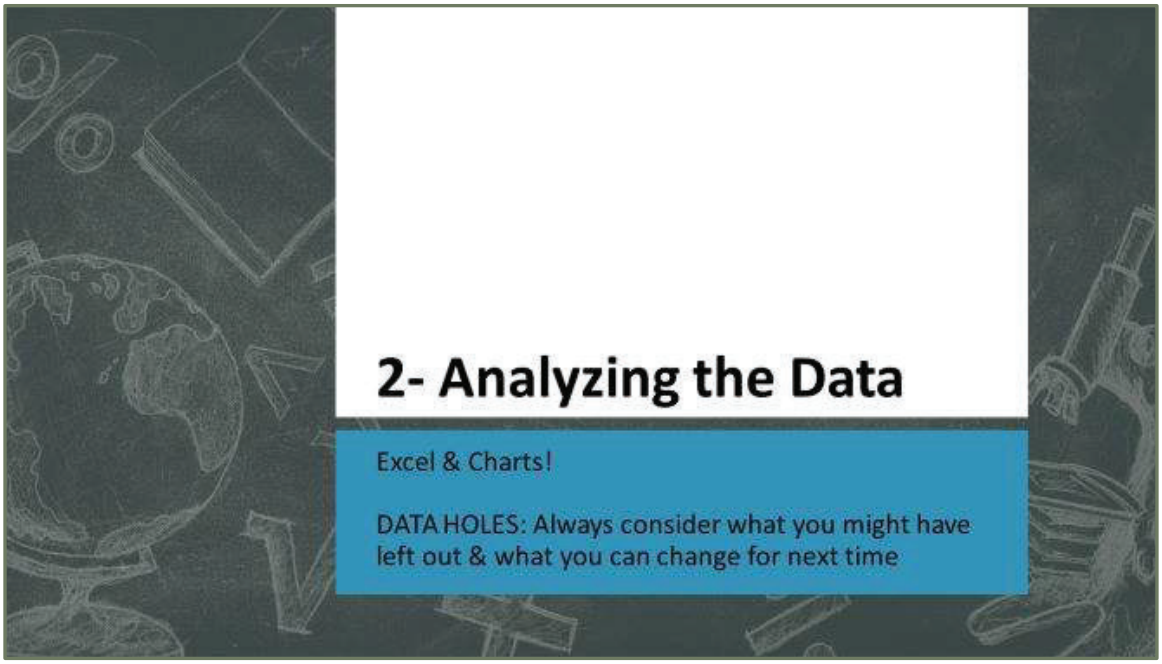
Notes:


• Our experiences / lessons learned / mistakes
Things to consider:
• More people – not always better
• Get through more material
• Less accurate?
• WEATHER! NOT IN SUMMER!
• Classroom Training – pros/cons
Sorting our materials with the class

Notes:


• Our experiences / lessons learned / mistakes
Things to consider:
• Don't add new categories on the day of
• CONSISTENCY
Sorting table
Clothes pile... potential donation items
Weighing our materials

Notes:


2- Analyzing the Data
Excel & Charts!
DATA HOLES: Always consider what you might have left out & what you can change for next time

Notes:

2011 Waste Audit Findings

Standard Operating Plan Planning, Conducting & Analyzing Waste Characterization Audits

Prepared by:
Booz Allen Hamilton, Inc.
121 South Tejon Street, Suite 900
Colorado Springs, Colorado 80903

Date:	Wednesday, June 8, 2011	Data Recorder:	David Bernie, Frank Spurgeon
Weather:	Overcast		
Recyclable Material			
Materials	**Materials & Container Weight Combined (lbs)**	**Tare Weight (lbs)**	**Calculated Material Weight (lbs)**
Mixed Paper	42.2	15.5	26.7
Mixed Paper	53.2	15.5	37.7
Mixed Paper	46.4	15.5	30.9
News Paper	27.4	13.0	14.4
Mixed Paper Subtotal			109.7
Cardboard	32.4	15.5	16.9
Cardboard	28	15.5	12.5
Cardboard	23.8	15.5	8.3
Cardboard	29.2	15.5	13.7
Cardboard	36.2	15.5	20.7
Cardboard	30.8	15.5	15.3
Cardboard	43.4	15.5	27.9
Cardboard	27.2	15.5	11.7
Cardboard	23	15.5	7.5
Cardboard	29.8	15.5	14.3
Cardboard	35	15.5	19.5
Cardboard Subtotal			170.3

Data Sheets - Tracking

Notes:

2011 Waste Audit Findings

27% of sorted waste was RECYCLABLE!

Landfilled	61.53	[tons/year]	
Currently Diverted	125.84	[tons/year]	
Additional Potentially Diverted	17.33	[tons/year]	
Total Potentially Diverted	143.17	[tons/year]	43%

Notes:

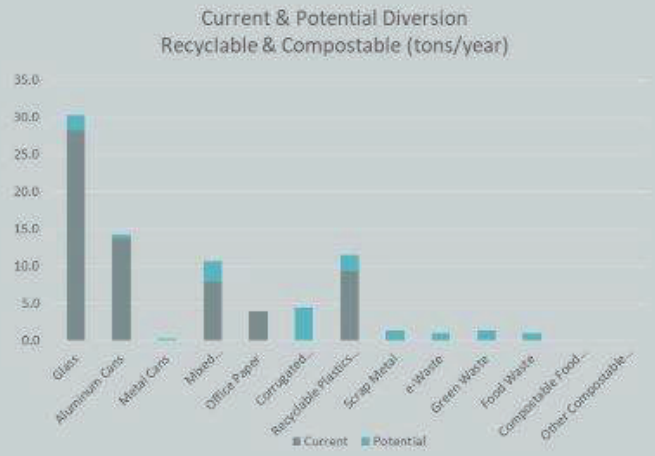
2011 Waste Audit Findings

ANOTHER WAY TO LOOK AT IT:

The BLUE is where we need to focus our outreach efforts on.

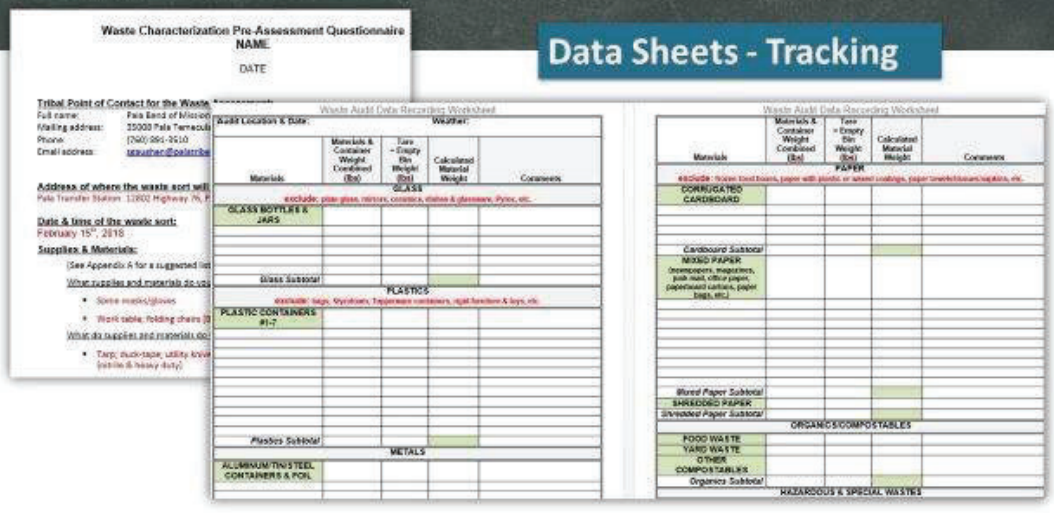
We primarily did outreach on recycling

- What to recycle
- Where to take it



Notes:

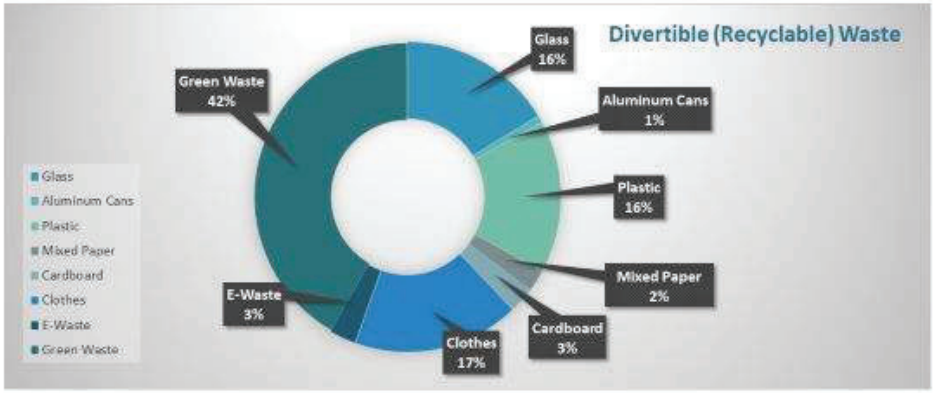
2018 Waste Audit Findings



Notes:

2018 Waste Audit Findings

45% of sorted waste was RECYCLABLE!



Notes:

2018 Waste Audit Findings

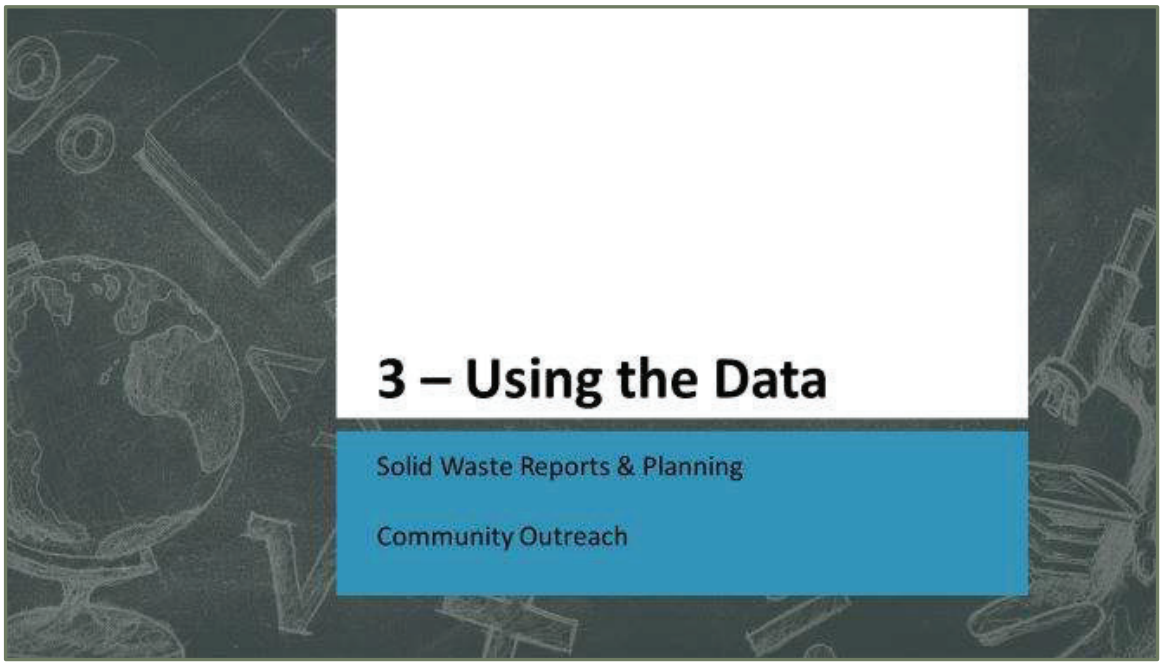
Problematic Wastes:

- **Medical Waste and Sharps:** Two used syringes and transfusion tubing was found in the residential waste.
- **Household Hazardous Waste (HHW):** Household cleaners, solvents, and automobile chemicals were found in the waste stream indicating residents likely need better options for disposing of HHW correctly including regular HHW events.
- **E-Waste:** Waste sort data indicates that relatively small amounts of e-waste were found in the residential waste.

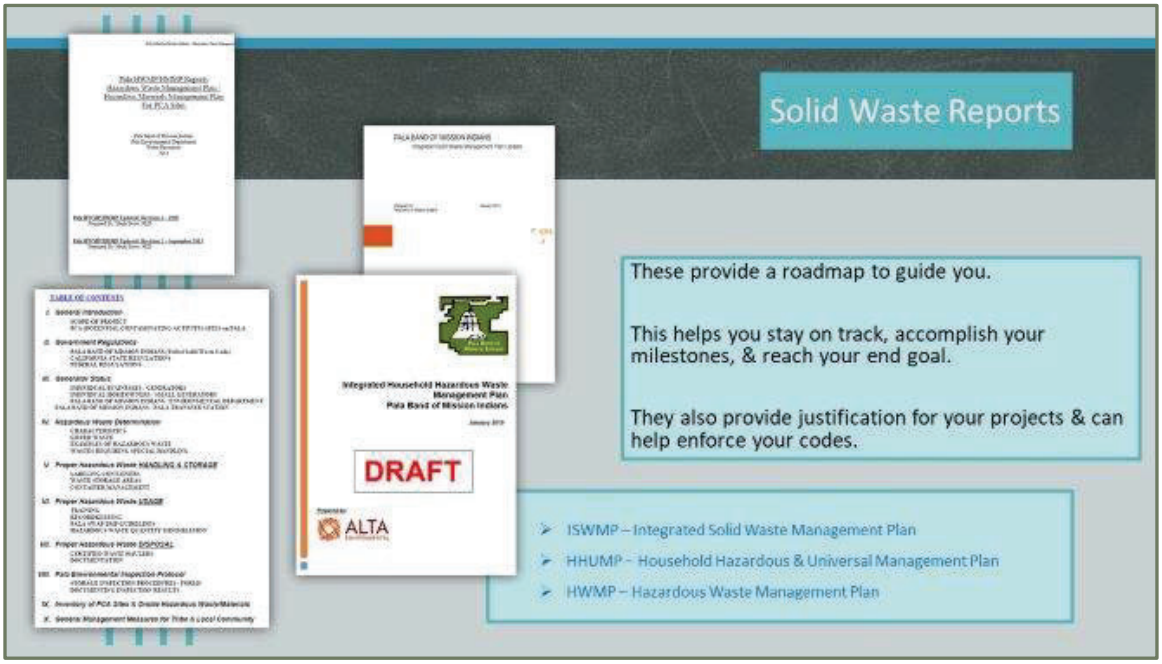
✓ *Continue promoting the proper disposal and recycling of problematic items at the Transfer Station and the Pala Environmental Department. Efforts should address HHW, white goods, vehicle batteries and parts, and e-waste.*

✓ *Monitor and anticipate increased e-waste generation.*

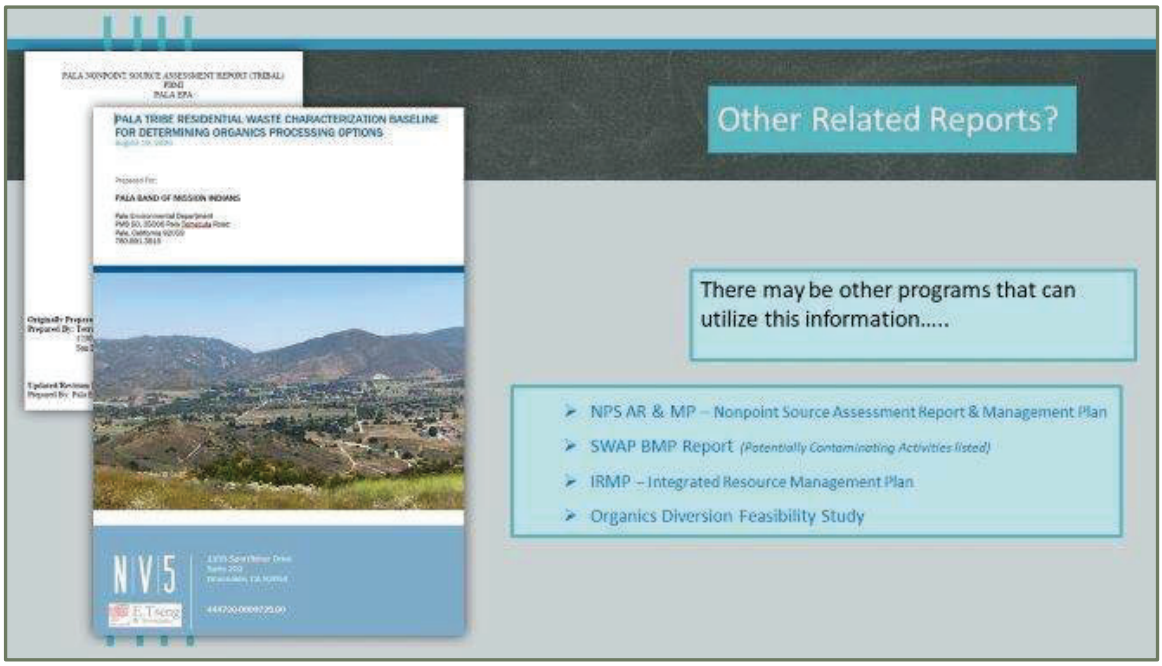
Notes:


3 – Using the Data
Solid Waste Reports & Planning
Community Outreach

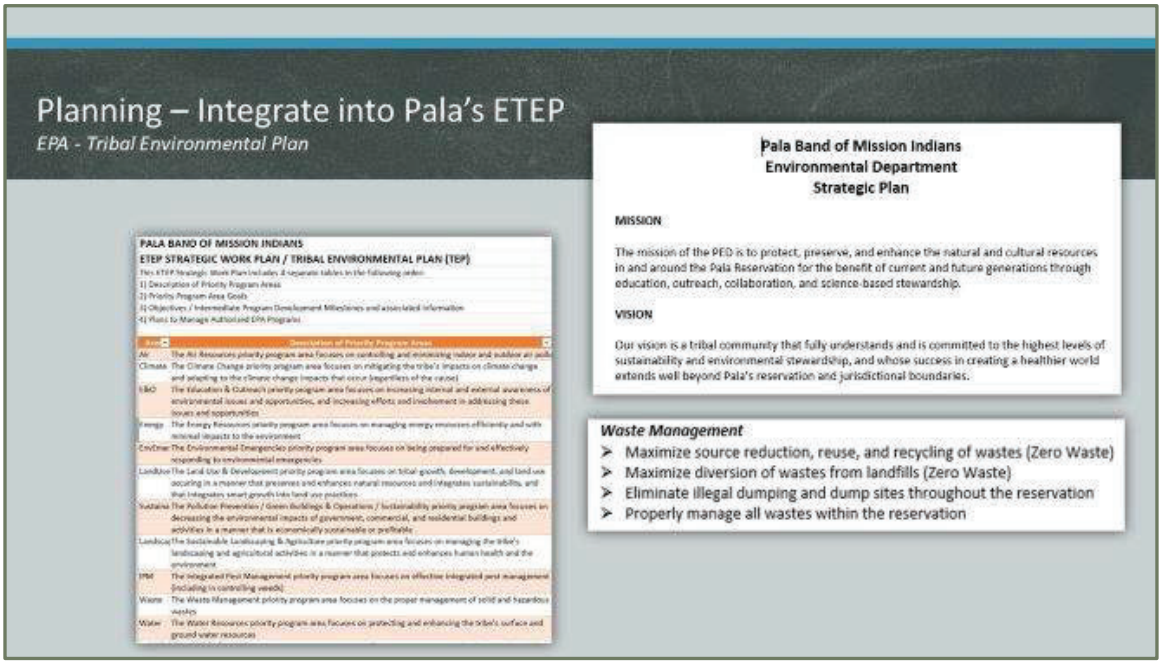
Notes:


Solid Waste Reports
These provide a roadmap to guide you.
This helps you stay on track, accomplish your milestones, & reach your end goal.
They also provide justification for your projects & can help enforce your codes.
DRAFT
ALTA
ISWMP – Integrated Solid Waste Management Plan
HHUMP - Household Hazardous & Universal Management Plan
HWMP – Hazardous Waste Management Plan

Notes:


PALA NONPOINT SOURCE ASSESSMENT REPORT (TRIBAL)
PALA TRIBE RESIDENTIAL WASTE CHARACTERIZATION BASELINE FOR DETERMINING ORGANICS PROCESSING OPTIONS
PALA BAND OF MISSION INDIANS
NV5
Other Related Reports?
There may be other programs that can utilize this information.....
NPS AR & MP – Nonpoint Source Assessment Report & Management Plan
SWAP BMP Report (Potentially Contaminating Activities listed)
IRMP – Integrated Resource Management Plan
Organics Diversion Feasibility Study

Notes:


Planning – Integrate into Pala's ETEP
EPA - Tribal Environmental Plan
PALA BAND OF MISSION INDIANS
ETEP STRATEGIC WORK PLAN / TRIBAL ENVIRONMENTAL PLAN (TEP)
Pala Band of Mission Indians
Environmental Department
Strategic Plan
MISSION
The mission of the PED is to protect, preserve, and enhance the natural and cultural resources in and around the Pala Reservation for the benefit of current and future generations through education, outreach, collaboration, and science-based stewardship.
VISION
Our vision is a tribal community that fully understands and is committed to the highest levels of sustainability and environmental stewardship, and whose success in creating a healthier world extends well beyond Pala's reservation and jurisdictional boundaries.
Waste Management
Maximize source reduction, reuse, and recycling of wastes (Zero Waste)
Maximize diversion of wastes from landfills (Zero Waste)
Eliminate illegal dumping and dump sites throughout the reservation
Properly manage all wastes within the reservation

Notes:


Planning – Pilot Programs
MAKE A DIFFERENCE
YOU
730
EVERY
670,140
EXTRA MONEY
$35,000
RECYCLE
Recycling Pilot Program
HOUSEHOLD HAZARDOUS
HHW Curbside Pilot
It's Time For Spring Cleaning!

Notes:


Community Outreach
PLANET PALA QUICK TIPS
ARE YOU WASTING FOOD?
40% OF OUR FOOD ENDS UP IN THE TRASH
LOVE FOOD, HATE WASTE
RECYCLING IS EASY AT THE PALA TRANSFER STATION
HELP CONSERVE NATURAL RESOURCES
7 SINGLE-USE SWAPS
USING GREEN CLEANERS
GREEN CLEANERS CAN LEAD TO A HEALTHIER HOME

Notes:

Show Success

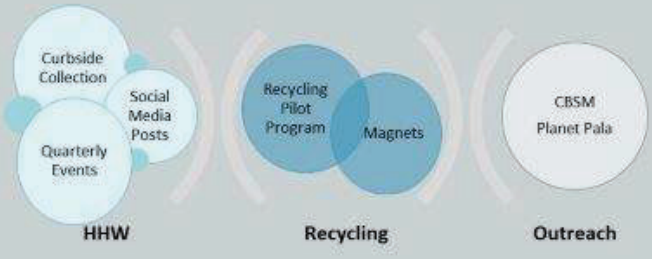
Use comparison charts to track community progress over the years

Show program success – to apply for new grants or grant deliverables

Show need to Tribal leadership (if you need more $$)

Notes:

Community Outreach



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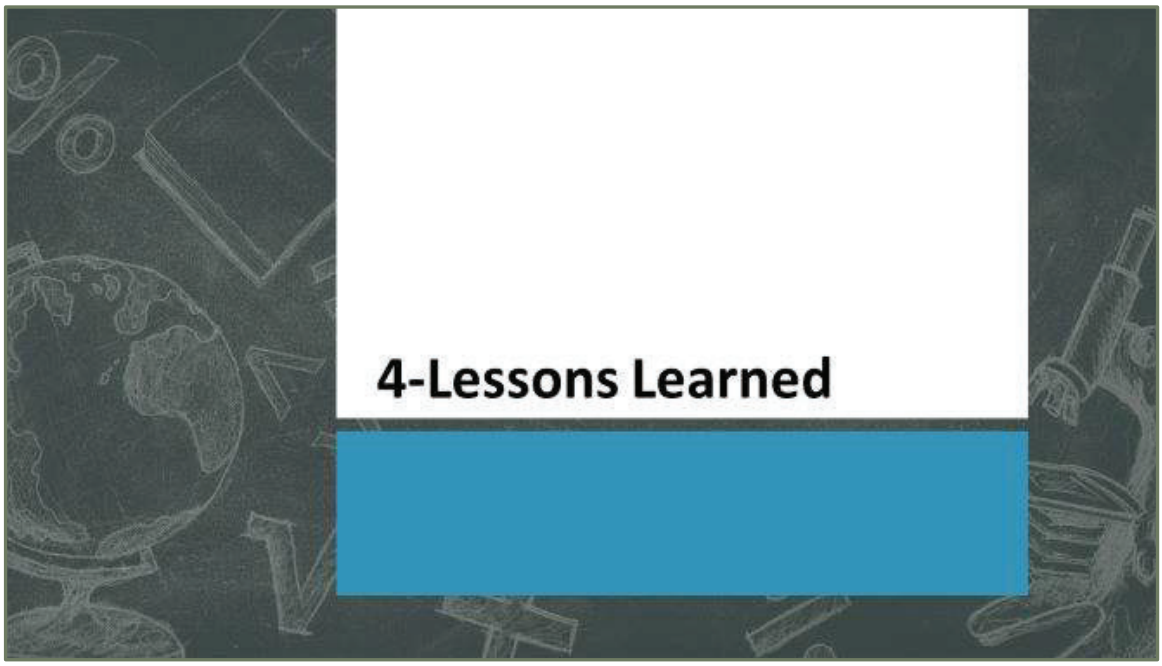

Notes:

Lessons Learned

This is how it works in an IDEAL world…

..but we live in the REAL world.

The importance of STAFF buy-in cannot be overstated enough.

Ask the right questions during a waste audit.

Notes:


Big picture takeaways:
Potential stumbling blocks to avoid....
THE MORE YOU KNOW
Know WHAT ANSWERS you need to find out
(so you can track the right categories)
Compare apples to apples
Evaluate what you missed to make the next one better

Notes:


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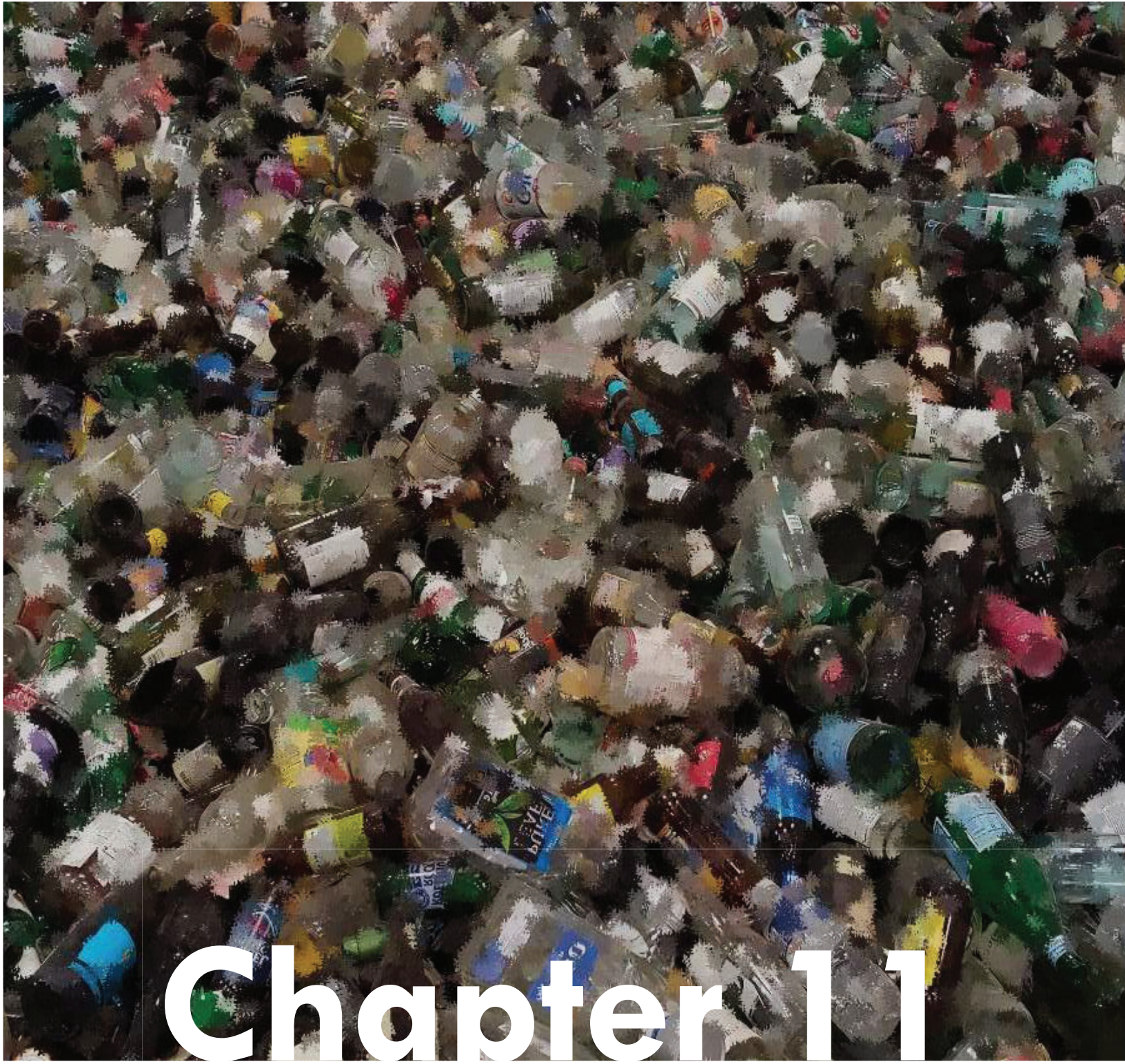

Chapter 11

Prairie Band of Potawatomi Nation's Waste Sort

Chapter 11

Virginia LeClere is the Environmental Manager for the Prairie Band Potawatomi Nation in Kansas. She has served the Tribe's Division of Planning and Environmental Protection in several capacities over the past 20 years. Prior to her management role, Virginia worked in the areas of environmental education/outreach, land use inventory, solid waste, and air quality. She holds an Associate of Arts degree in Liberal Arts from Haskell Indian Nations University, a Bachelor of Science degree in Management and Leadership from Friends University, and a Master of Science Degree in Management from Baker University. Virginia is a delegate to the Region 7 Joint USEPA/Tribal Operations Committee, delegate and the National Steering Committee on Tribal Waste and Response Assistance Program.