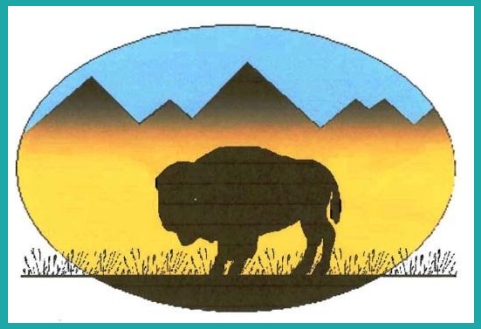
Solid Waste Mgt. in Indian Country



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Solid Waste Management in Indian Country

Who Regulates Solid Waste in Indian Country*?

Primarily Tribes and/or States depending on:

- Land Status? (*tribal, fee, trust, etc*.)
- Tribal Member vs Non-member?

**NOTE: US EPA Regulates Hazardous Waste under RCRA Subtitle C*

Tribal Jurisdiction vs Authority

- Jurisdiction*: Established by Treaty and federal laws, courts, policy and legal precedents

  **can vary by land type: Tribal, Trust, Allotted, Fee, etc.*

- Authority: Established by Tribal laws and Codes

Solid Waste Act of 1976 & the Resource Conservation and Recovery Act (RCRA) of 1980.

Different from other Environmental Acts (SDWA, CWA, CAA)

Tribes: Defined as a "municipality"; The RCRA (Subtitle D) solid waste criteria and regulations are self-implementing. The responsibility of daily SWM activities (i.e., collection, hauling, enforcement, etc.) is retained by the "operating governmental authority".

States: Generally do not have authority to implement a RCRA program on reservations*, regardless of whether a tribal program exists.

{* *exception for "fee lands" in some cases*}

EPA: Can only act in the case of "imminent and substantial endangerment to the health or environment" (RCRA 7003 Order). EPA is authorized to rectify the situation, but must first have data to support its actions.

EPA Approval of Tribal Solid Waste Programs?

In October 1996, the Supreme Court ruled the EPA could not grant the Tribes solid waste program approval. The reasoning used is based on the passage in RCRA that defines Indian tribes as “municipalities”, not states, and RCRA says nothing about municipalities submitting permitting plans for [EPA's] review.

Solid Waste Responsibility

Assignment of full responsibility to tribes was initiated in 1987, when Mattie Blue Legs (a tribal member) and other residents sued the Oglala Sioux Tribe, EPA, BIA, and IHS under RCRA 7002 (Citizen Suit) to clean up the open dumps on the reservation.

The federal court ruled that it was the tribe who has the primary responsibility to regulate, operate and maintain the reservation SW sites.

“Blue Legs” Case History

1990 US District Court orders defendants to comply with Option 1 Plan, developed by the Tribe, IHS and BIA;

2004 Mattie Blue Legs vs. BIA, IHS, OST re-filed.

The new complaint alleges that the transfer stations are over-run with waste and not managed consistent with the original order, Tribal codes or RCRA. Plaintiffs to the current case request the Court reopen Blue Legs I.

Tribal SW Landfills

Tribes are able to build and operate landfills. However, they must meet the federal criteria of 40 CFR Parts 257 and 258.

What is an “Open Dump?”

<u>Any Landfill</u> that does meet the federal criteria in 40 CFR Parts 257 or 258

Open Dumping can be difficult to regulate or control due to jurisdictional issues

Open Dump Cleanups are being conducted by Tribes with assistance from US EPA and IHS.

BEFORE

AFTER

Tribes are trying to control Open Dumping

“Open Dumps”

“Indian Lands Clean Up of Open Dumps Act” of 1994.

<u>Congressional findings included:</u>

- Open dumps threaten the health and safety of residents of Indian lands and contiguous areas;
- Many of the dumps were established or (were) used by Federal agencies such as the Bureau of Indian Affairs and the Indian Health Service; and
- Most tribal governments lack the financial and technical resources necessary to close and maintain these dumps in compliance with applicable Federal laws.

Purposes of the Act

(1) Identify the location of open dumps on Indian lands;

(2) Assess the relative health and environmental hazards posed by such dumps; and

(3) Provide financial and technical assistance to Indian tribal governments, either directly or by contract, to close such dumps in compliance with applicable Federal standards and regulations, or standards promulgated by an Indian tribal government if such standards are more stringent than the Federal standards.

Authority of the Director of the Indian Health Service.

Reservation Inventory: Upon request by an Indian tribal government or Alaska Native entity, the Director shall:

(A) conduct an inventory and evaluation of the contents of open dumps on the Indian lands or Alaska Native lands which are subject to the authority of the Indian tribal government or Alaska Native entity;

(B) determine the relative severity of the threat to public health and the environment posed by each dump; and

(C) develop cost estimates for the closure and post closure maintenance of such dumps.

The inventory and evaluation shall be carried out cooperatively with the US EPA.

IHS Financial & Technical Assistance

The IHS shall provide financial and technical assistance to the Indian tribal government or Alaska Native entity to carry out the activities necessary to:

(1) close such dumps; and

(2) provide for post closure maintenance of such dumps.

IHS Assistance Priorities

All assistance shall be made available on a site-specific basis in accordance with priorities developed by the IHS.

Priorities on specific Indian lands or Alaska Native lands shall be developed in consultation with the Indian tribal government or Alaska Native entity.

The priorities shall take into account the relative severity of the threat to public health and the environment posed by each open dump and the availability of funds necessary for closure and post closure maintenance.

Open Dump Inventory Survey Form

SOLID WASTE SURVEY FORM

Refer to OMDS field guide for definitions of terms

Version 12/17/2008

Facility Name: _____

Community: _____ **Tribe:** _____

State: _____ **County:** _____ **EPA ID** (if any) _____

Lat/Long: N_____(Decimal) W_____(Decimal)

Land Status: ___AK Native Land ___Allotted ___Fee ___NM Pueblos ___Private ___Trust (Individual) ___Trust (Tribal)

Solid Waste System Type (check one)	**Condition (check one)**
___Solid Waste Disposal Site	___Open Dump-Buried ___Open Dump-Surface ___Closed ___Cleaned up ___Upgraded ___Properly Managed

Field Guide for OMDS Data Gathering / Data Entry

Updated 6/5/08

OMDS Category	OMDS Field	Description	Valid Values
General System Information	**FDS#**	Facility Data System Number – assigned by IHS	Unique number assigned via algorithm - for solid waste systems 5th and 6th digits are 3 and 0 respectively for solid waste sites
	System Type	Type of sanitary system Only available when adding a new system.	Choose from drop down list: Sewer Sewer Dist Solid Waste Water Water Dist
	Tribal System?	Is the system or site tribally owned and/or operated? Checked = yes	Checked Unchecked
	Certified Operator?	Is system operator certified? Checked = yes This most commonly will be unchecked for solid waste systems. Applies primarily to water and sewer system operator certification. Some states have certification for solid waste operators that tribal operators might certify with.	Checked Unchecked
	Facility Name	A descriptive name of the solid	Name of dump site

OD Health Threat Score

Size

- Based on surface area reported

Hazard factors

- Contents
- Rainfall
- Site drainage and leachate potential
- Flooding potential
- Frequency of burning

Proximity factors

- Vertical distance to drinking water aquifer
- Horizontal distance to surface water
- Distance to homes

The basic data library

https://wstars.ihs.gov

Sanitation Tracking and Reporting System (STARS)

Welcome to STARS, a system of the Indian Health Service (IHS).

The mission of the Indian Health Service (IHS) is to raise the health status of the American Indian and Alaska Native people to the highest possible level by providing comprehensive health care and preventive health services. To support the IHS mission, the Division of Sanitation Facilities Construction (DSFC) provides technical assistance and sanitation facilities services to American Indian tribes and Alaska Native villages for cooperative development and continued operation of safe water, wastewater, and solid waste systems and related support facilities. STARS is a web-based database used to track sanitation facilities projects. It also contains information on existing Operation and Maintenance (O&M) organizations serving American Indians and Alaskan Natives (AI/AN).

STARS includes six major data systems:

1. COMMUNITY, also known as CDP (Community Deficiency Profile), has information on the number and types of homes in AI/AN communities;
2. SDS – the Sanitation Deficiency System documents information about sanitation deficiencies related to AI/AN individual homes and communities;
3. PDS – the Project Data System is used to track DSFC sanitation facilities construction projects;
4. HPS – the Housing Priority System is used to document, prioritize, and allocate resource needs for DSFC projects for new and like-new housing;
5. OMDS – the Operation and Maintenance Data System contains information about water, wastewater and solid waste systems serving AI/AN people and the organizations that operate systems; and
6. HITS – the Home Inventory Tracking System is used to track applications for sanitation facilities to individuals and specific home sites.

SELECT AN AREA

Click an area on the map or the list below.

Aberdeen Area	Nashville Area
Alaska Area	Navajo Area
Albuquerque Area	Oklahoma Area
Bemidji Area	Phoenix Area
Billings Area	Portland Area
California Area	Tucson Area

Tribal Solid Waste Programs:
2 key Documents

ISWMP

Tribal Solid & Hazardous Waste Codes

"Integrated Solid Waste Mgt. Plan"

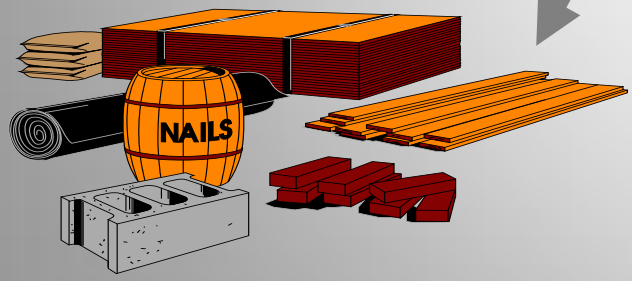
US EPA Guidance on Tribal ISWMPs developed in collaboration with the IHS

Integrated Waste Management System

Collection

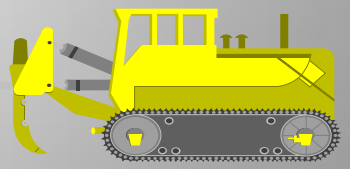
Recycle

Transfer Station



Materials Recovery

Diversion



Disposal

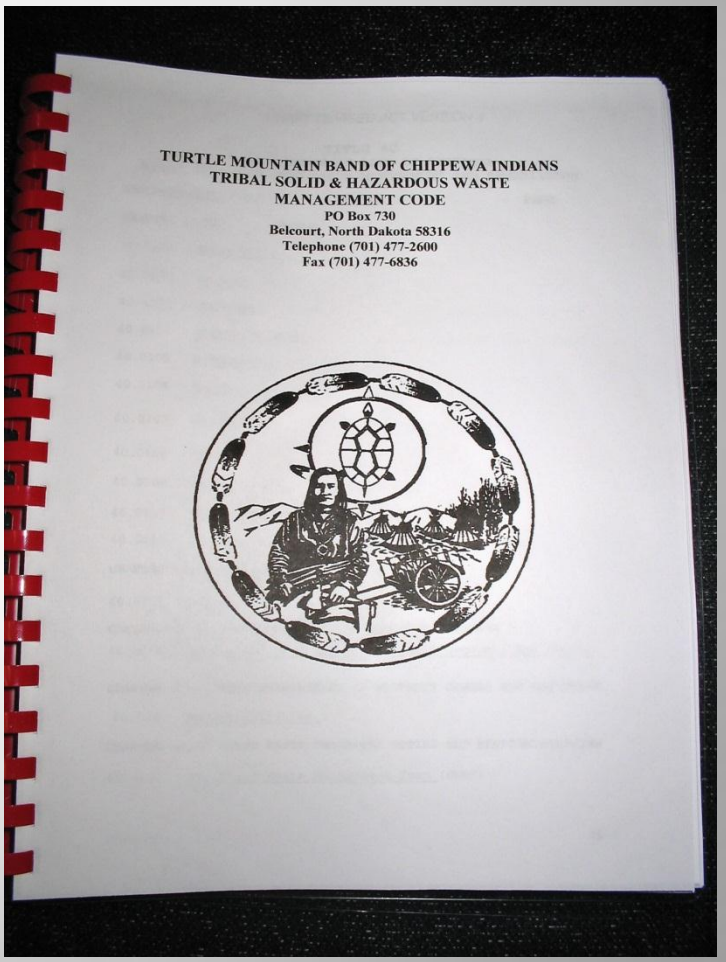
US EPA ISWMP Guidance*

5 Elements of an ISWMP include descriptions of:

1) The community service area;
2) The Tribe's solid waste program structure & administration;
3) The Tribe's current and proposed waste management practices;
4) The funding and sustainability and the long-term goals of the Tribe's solid waste program; and
5) Demonstration of approval of the plan by appropriate governing body.

**NOTE: long & short templates available*

Tribal SW Compliance & Enforcement is increasing



Sustainability Evaluation Tool

Developed by US EPA and IHS:

- Evaluation Tool to measure the sustainability of a waste management system or program.
- Specifically focused on tribal waste systems.

Goal of the Evaluation Tool is:

✓ to assist tribes to identify strengths and weaknesses in key areas of waste management; and

✓ to make improvements in order to provide the best possible service while protecting public health and the environment.

Focus on <u>seven</u> key areas:

- planning
- financial viability
- management
- staffing
- operations
- coordination
- compliance/enforcement

Sustainability Evaluation Tool

Potential outcomes are:

- ✓ to help to attract funding or technical assistance,
- ✓ demonstrate the effectiveness of previous assistance,
- ✓ help ensure that unnecessary costs are avoided; and
- ✓ systems are capably managed.

Tribal Solid Waste Collection & Management

Tribal Solid Waste Challenges

- Funding
  - ✓ Setting and Collecting Fees
  - ✓ USDA-RD Grants and/or Loans
  - ✓ IHS SDS or US EPA funding
- Open Dumps
- Updating & Replacing Equipment
- Jurisdiction Issues
- Civil Compliance & Enforcement
- Good enforceable codes & ordinances
- Community Support
- Running SW System as a “Business”

Collection & Management of “Garbage” a challenge for all governments

Types of Tribal SW Systems

- Tribal Collection & Tribal Landfill
- Tribal Collection & Off-Reservation Landfill
- Commercial Collection & Off-reservation Landfill also may have:
- Tribal Transfer Station
- Commercial Transfer Station

Types of Collection

- Curb-side Containers

- Small Community Dumpsters

- Large Dumpsters at Collection Stations

Types of Landfills

- Municipal Solid Waste (regular garbage)
- C&D-Inert Wastes
- Special or Industrial Wastes
- Hazardous Waste (regulated by US EPA)

High Volumes of “C&D” or “Inert” Wastes

Unmanaged Inert waste becomes an “Open Dump”!

Other Waste Challenges: Tires

Other Waste Challenges: Junk Vehicles

Electronics (E) Waste

Computers (monitor, drive, keyboard, mouse, printer, etc.)
Televisions
Fax machines
Copy machines
Cell phones

Vegetative Wastes

White Goods

Burn Barrels and Backyard Burning

Disaster Debris Collection & Mgt.

Hazardous Wastes

Household Hazardous Wastes

Hazardous Household Waste. Photo courtesy of CDC/ATSDR.

Oil & Gas Field Wastes

ALL wastes from Oil & Gas Exploration & Production are exempt from U.S. EPA Regulation

Produced Waters

“TENORM” Wastes

Oil & Gas Field Wastes

Drilling Cuttings

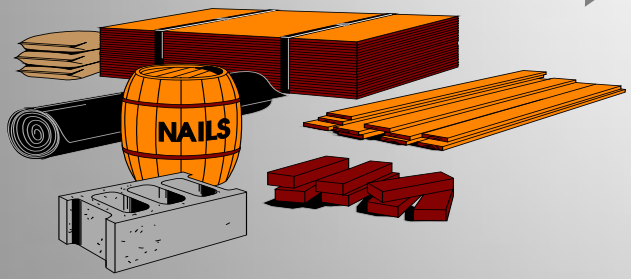
Drilling Waste Pits

MSW Transfer Station vs Landfill?

When is a Transfer Station Practical & Cost Effective?

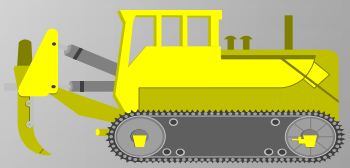
Collection

Transfer Station



Materials Recovery Facility

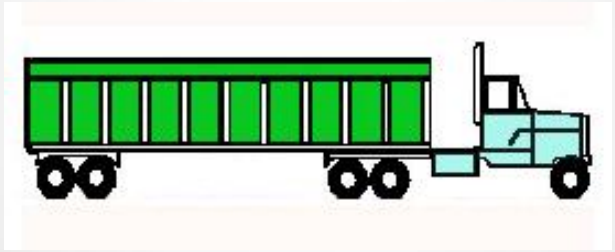
Diversion



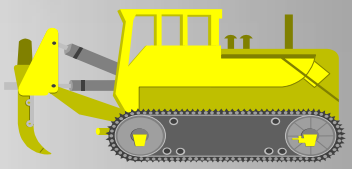
Disposal

Transfer = Cost Savings

Collection



Transfer

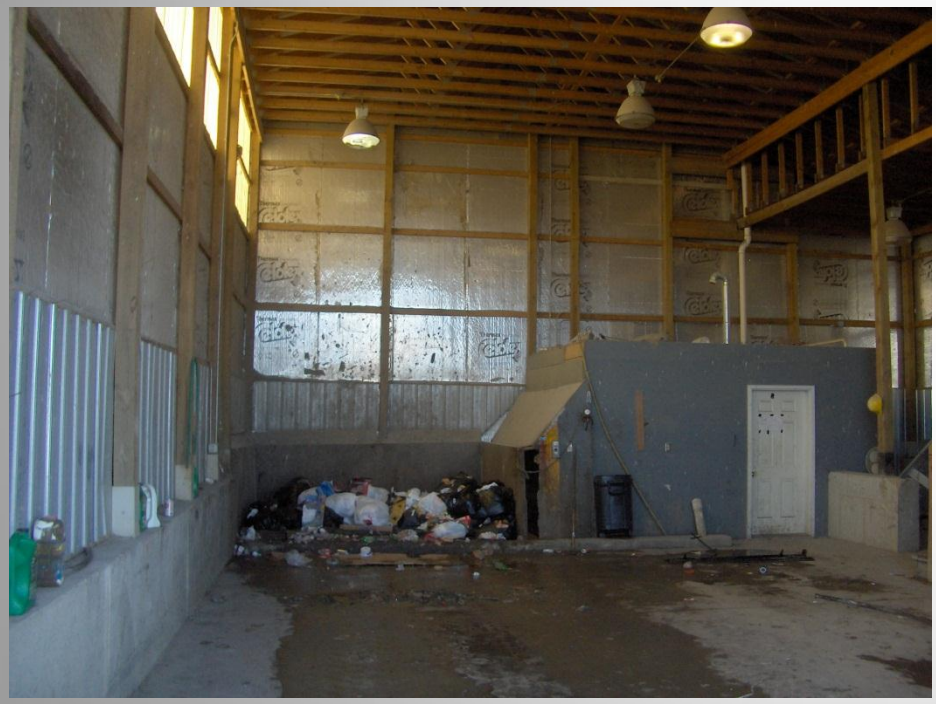


Disposal

Pitless Scale

Stationary Compactor

Transfer Stations: Compactors



Drop into a Ram Compactor & Haul Box

MSW Baler

Transfer Stations

Baler System

Drop Floor & Trailer System

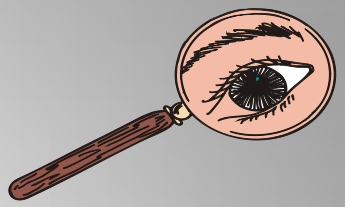
SPIRIT LAKE TRANSFER STATION

Transfer without a Station

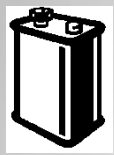
Waste Screening Critical!

Waste Screening

Identify and Segregate:



- Hazardous Waste



- Lead Acid Batteries

- Appliances

- Green Waste

- Bulky Items

- Recyclables

- Medical Wastes

Monitoring of Waste to Avoid Hauling Air

Transfer Station Planning Elements

- Conceptual Plan
- Economic Feasibility Analysis
- Permitting
- Site Selection

Benefits of Transfer Systems

- Cost Savings
- Environmental Benefits
- Waste Diversion and Materials Recovery
- Waste Screening
- Collection Fleet Efficiency
- Flexibility in Selecting Disposal Sites

Waste Deliveries

- Tribal or Public Collection Fleet
- Contract/Franchise Collections
- Commercial Deliveries
- Residential Self-Haul

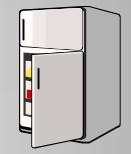
Diversion of Self-Haul Waste:

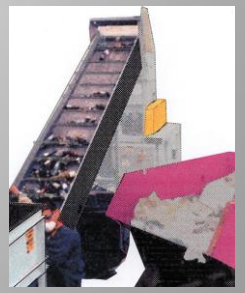
- Yard Waste
- White Goods
- Tires
- C & D
- Paper
- Metal
- Plastic
- Newsprint
- Glass
- Cardboard

Provide containers for source-separated materials.

Waste Diversion

Residential Recyclables	→	Market
Green Waste	→	Compost
White Goods	→	Salvage
Tires	→	Chipping or Baling
Commercial/Industrial Discards	→	Processing and Recycling





Public Perspective: Potential Negatives

- Can Produce Localized Impacts
- Concerns Regarding Odor, Dust, Noise, Vectors, Litter
- Truck Traffic and Vehicle Emissions
- Some Opposition Based on Misconceptions
- Off-Reservation Wastes

Feasibility Analysis

Compares Solid Waste Transfer to Direct Haul: $/hour

- Input cost of transfer
- Input tipping fee
- Input round-trip travel time
- Input hourly wages
- Station Equipment/System O&M Costs

Transfer Haul Costs

- Personnel Wages
- Personnel Benefits
- Fuel, Oil, Tires, Maintenance
- Lease or Cost of Capital
- Insurance, Taxes, Licenses, etc.

Disposal Site Flexibility

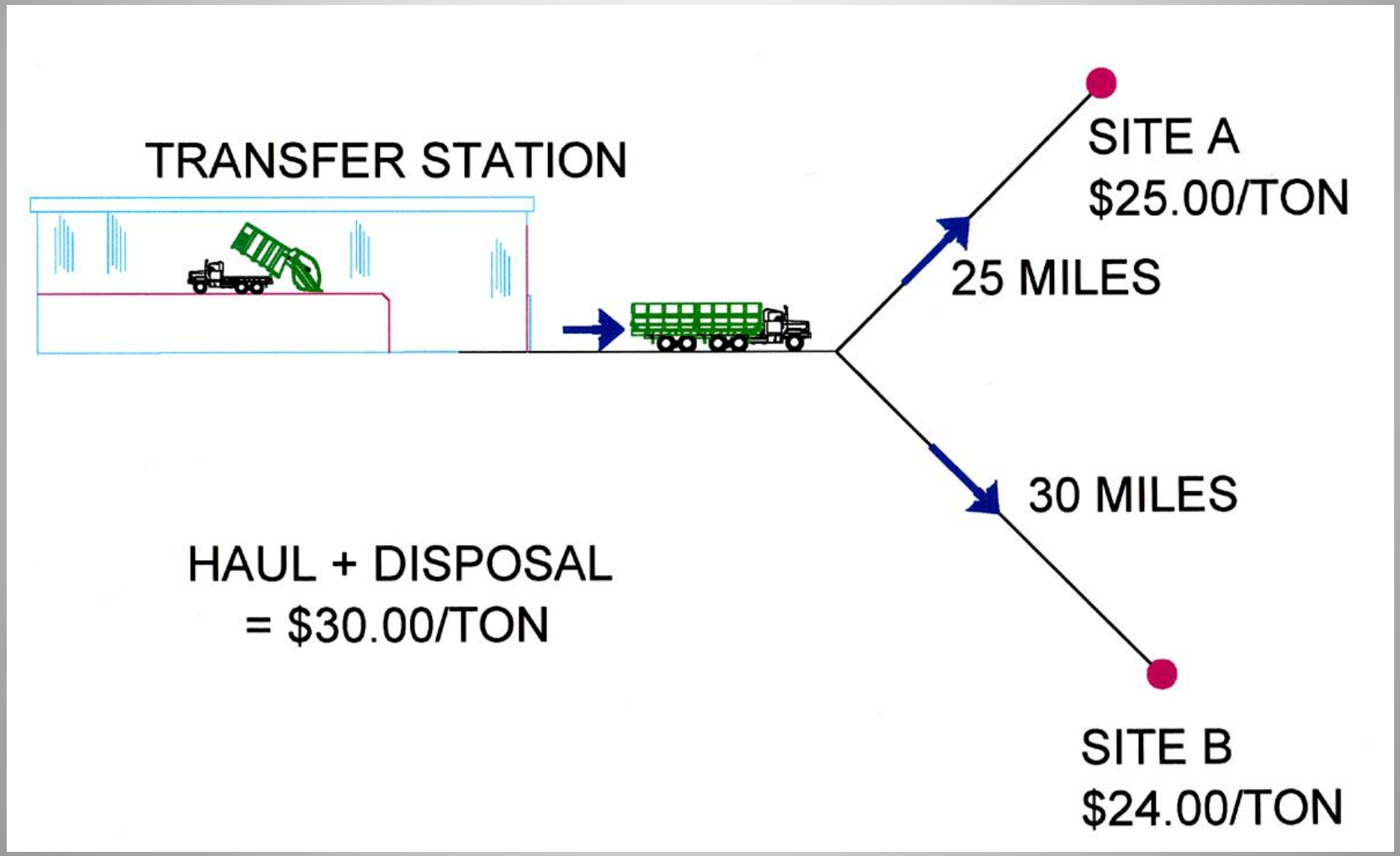
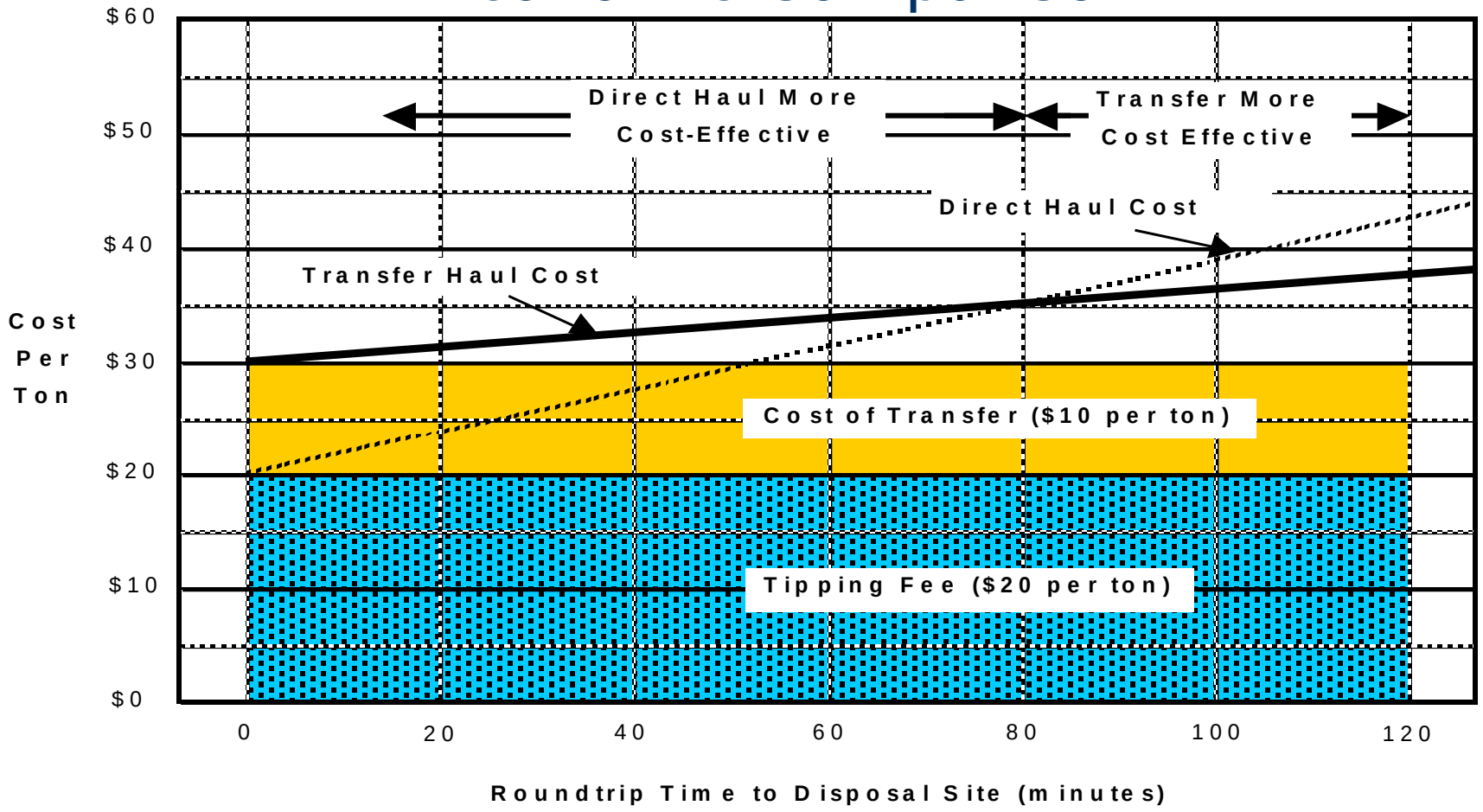


Figure 3.1
Transfer vs. Direct Haul
Economic Comparison



Project Specific Factors:

- Transfer Trailer Capacity 21 tons
- Collection Vehicle Capacity 7 tons
- Personnel Costs 25 $/hr
- Transfer Vehicle Cost 120 $/hr

- Tipping Fee 25 $tons
- Cost of Transfer 12 $tons
- Round-trip Travel Time 180 min.
- Collection Vehicle Cost 100 $/hr

Difficult Wastes to Transfer

- Bulky goods (tree stumps, mattresses, tires, etc.)
- Street sweepings (and other fines)
- Excessive drywall
- Carpeting
- Wiring
- Construction & Demolition (C & D) Wastes

  aka “inert wastes”.

Typical Densities –

Transfer Mode	lb/yd³
Open-Top Trailers	300-500
Stationary Compaction	600-800
Pre-Compaction	600-800
Baled Material	1200-1500

Metric: 1lb/yd³ = .594 kg/m³

Disposal Site Parameters

- Ownership/Contracts
- Tipping Fees
- Long-Term Availability
- Hours of Operation
- Access/Travel Time

Disposal Site Parameters (continued)

- Special Equipment (i.e., Tipper, Forklift)
- Off-Road Conditions
- Turn-Around Time On-Site
- Long-Term Contract
- Environmental Liability

Engineering Plans and Specifications

- Site Plan
- Floor Plan
- Traffic Flow
- Utilities and Fire Control
- Ancillary Uses

Floor Plan Objectives

- Traffic and Unloading Efficiency
- Minimum Wait Time
- Quick Turn-Around for Transfer Trailers
- Public Facilities (ideally separate)
  - Will Public be allowed to use site?
  - Need more supervision
  - Several Safety Issues
  - Scavenging

Inspection and Enforcement

- Recordkeeping
- Compliance with Operating Plans
- Emergency Preparedness
- Employee Training
- Notice of Violation, Fines, etc.

Siting Factors

- Economic
- Environmental
- Cultural
- Physical Limitations
- Access
- Weather-Winds

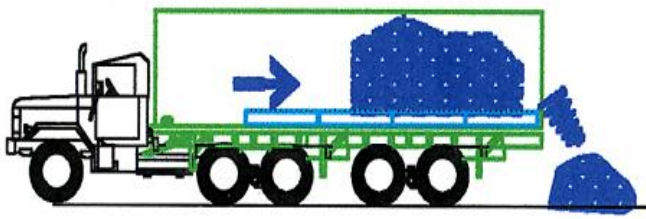
Transfer Technologies

- Open-Top
- Compaction
- Pre-Compaction
- Baling
- Surge Pit
- Rail Haul
- Marine Transfer
- Convenience Centers

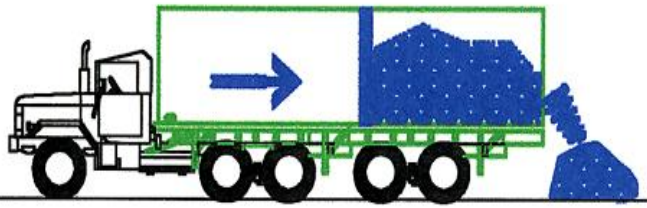
Technology Integration

- Mode of Delivery
- Unloading
- Sorting/Inspection
- Processing and Loading
- Transfer Haul
- Unloading

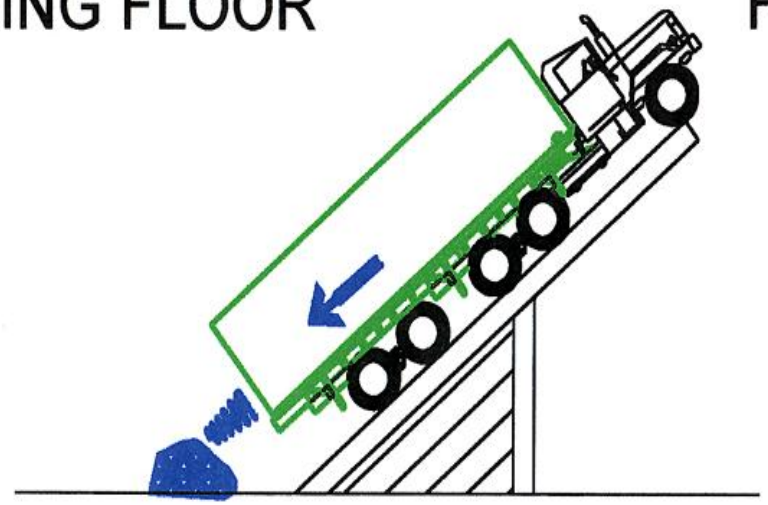
Unloading Technology Options



WALKING FLOOR

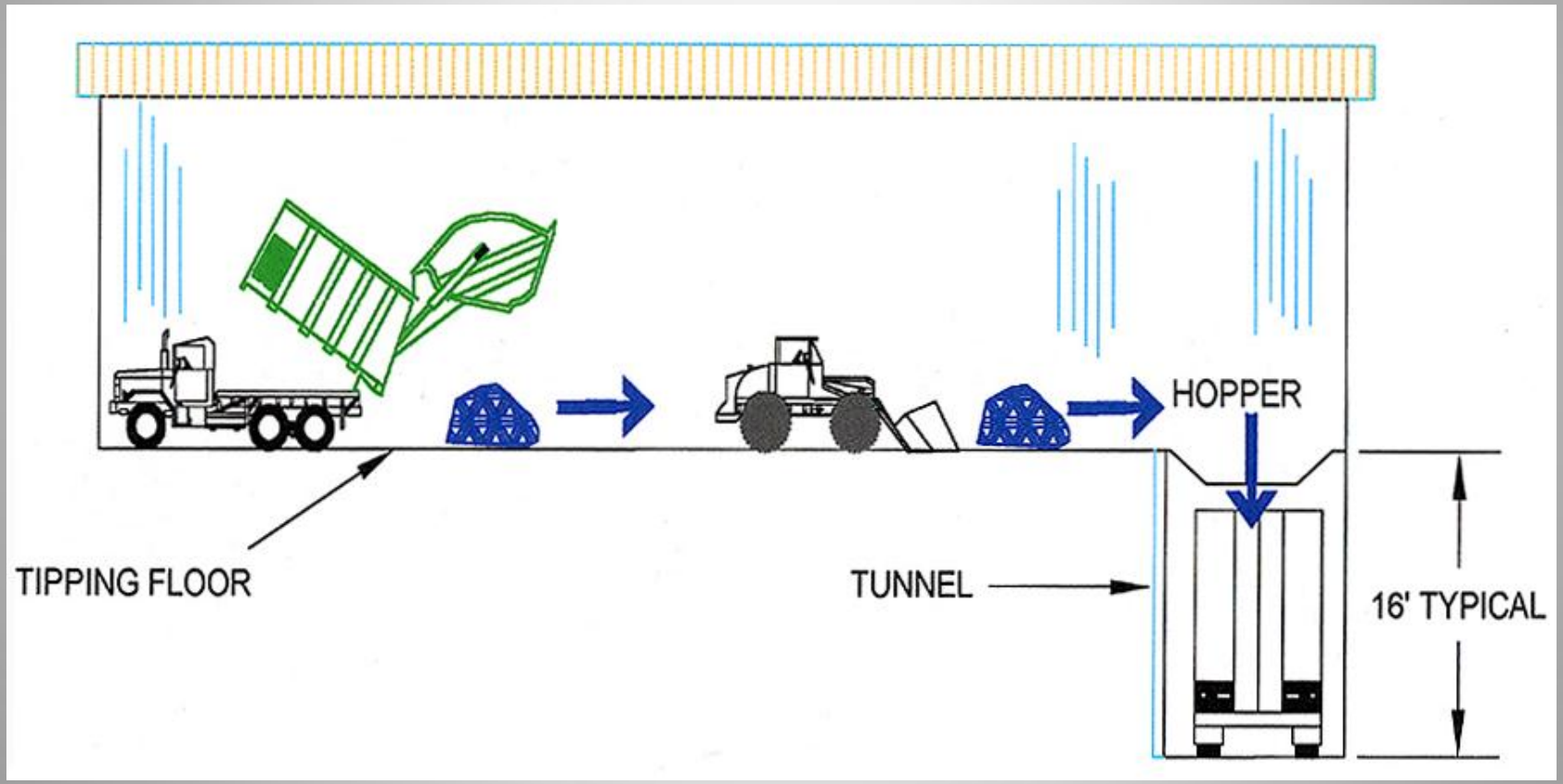


HYDRAULIC RAM



LANDFILL TIPPER

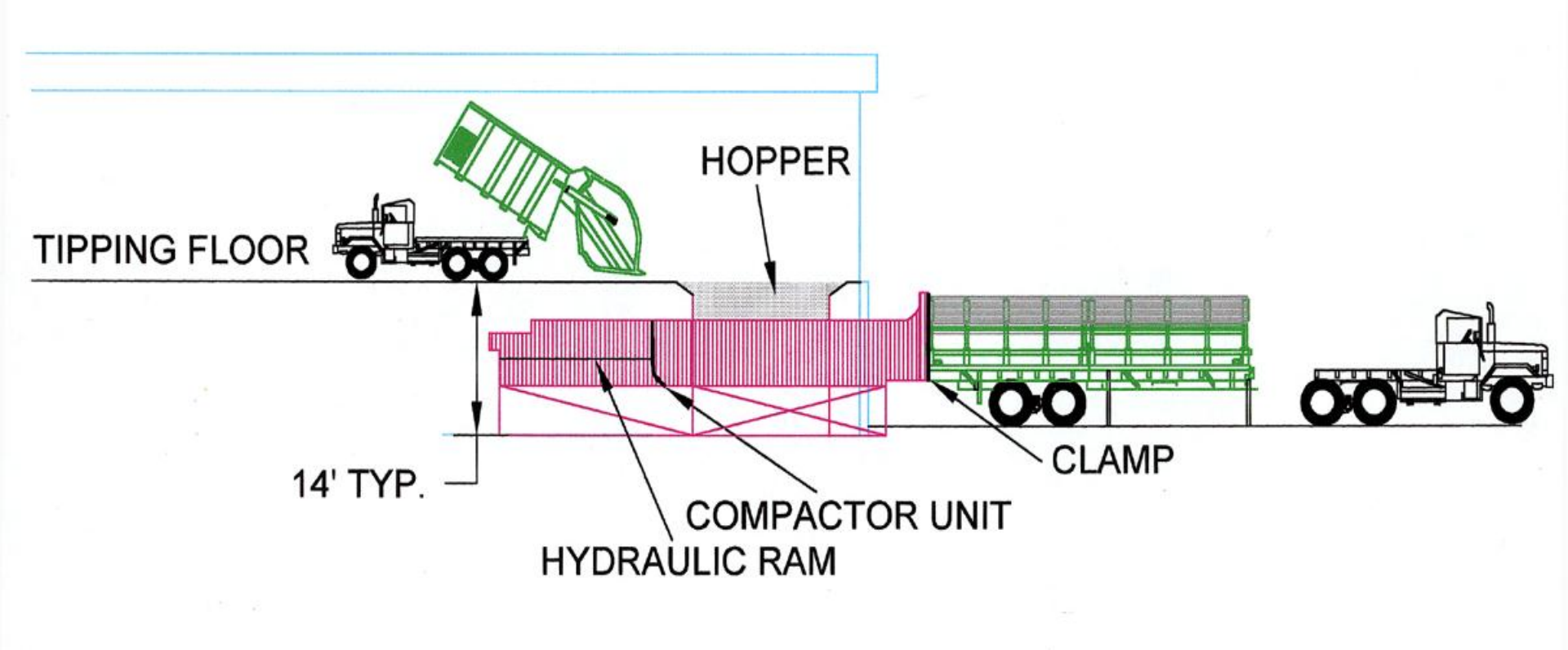
Open-Top Technology



Open-Top Technology Parameters

- High Flexibility
- Low Density
- Simple & Effective
- Low Operating Cost
- Walking Floors or Tippers to Unload

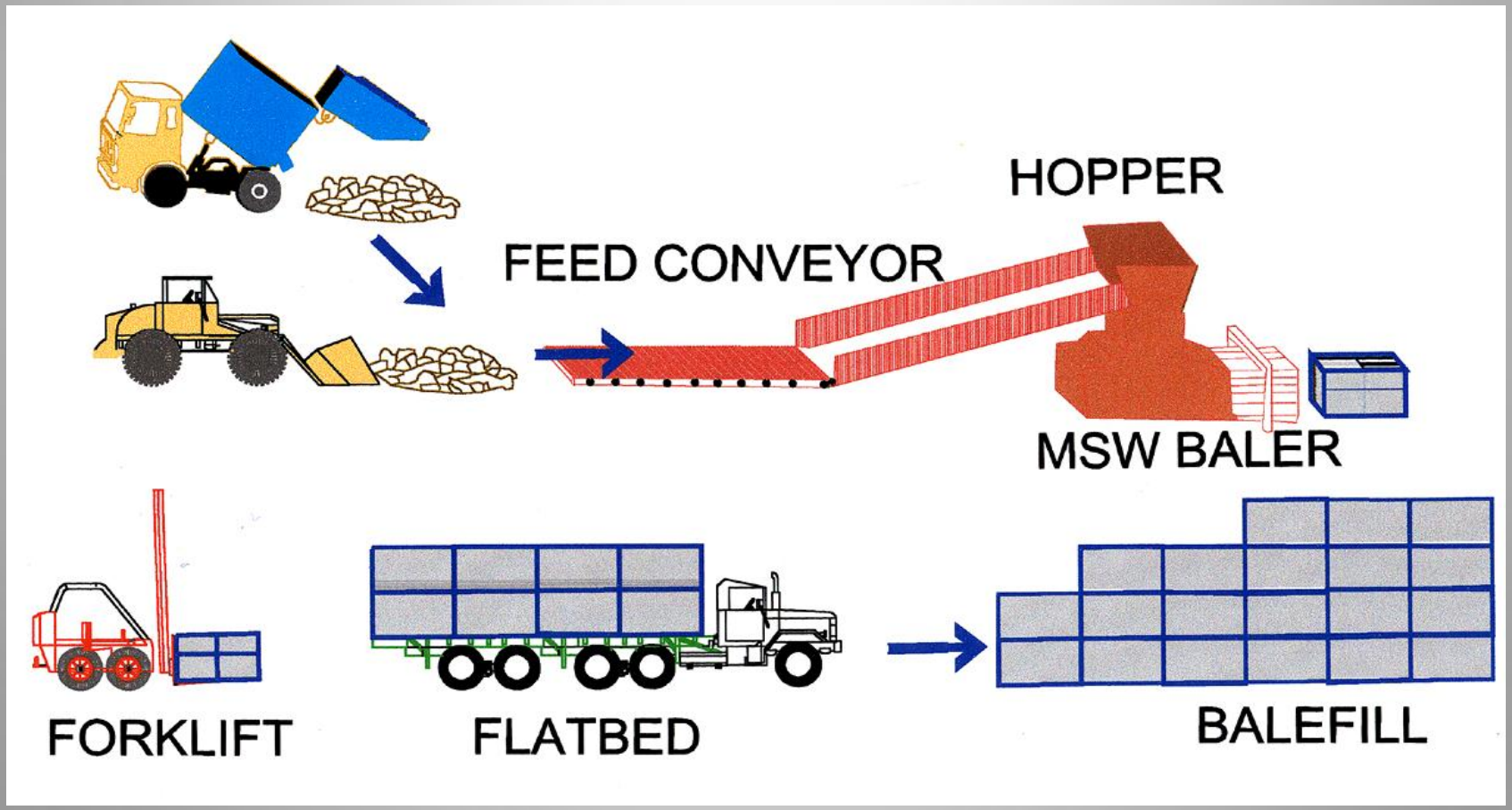
Typical Compactor System



Stationary Compaction - Parameters

- Low Payload
- High Cycle Times
- Mechanical Systems Require Redundancy or Contingency
- High Maintenance
- Self-Unloading

Baler System



Baler Parameters

- High capital and operating costs
- High density payloads
- Special equipment required (e.g., forklift)
- Can be used for recyclables
- Redundancy or contingency plan required
- Best used in conjunction with dedicated *balefills*

Ancillary Site Uses

- Citizens Drop-off
- Vehicle Storage/Maintenance/ Fueling
- Administration/Education
- Materials Recovery Facilities
- Waste Diversion
- Future Needs

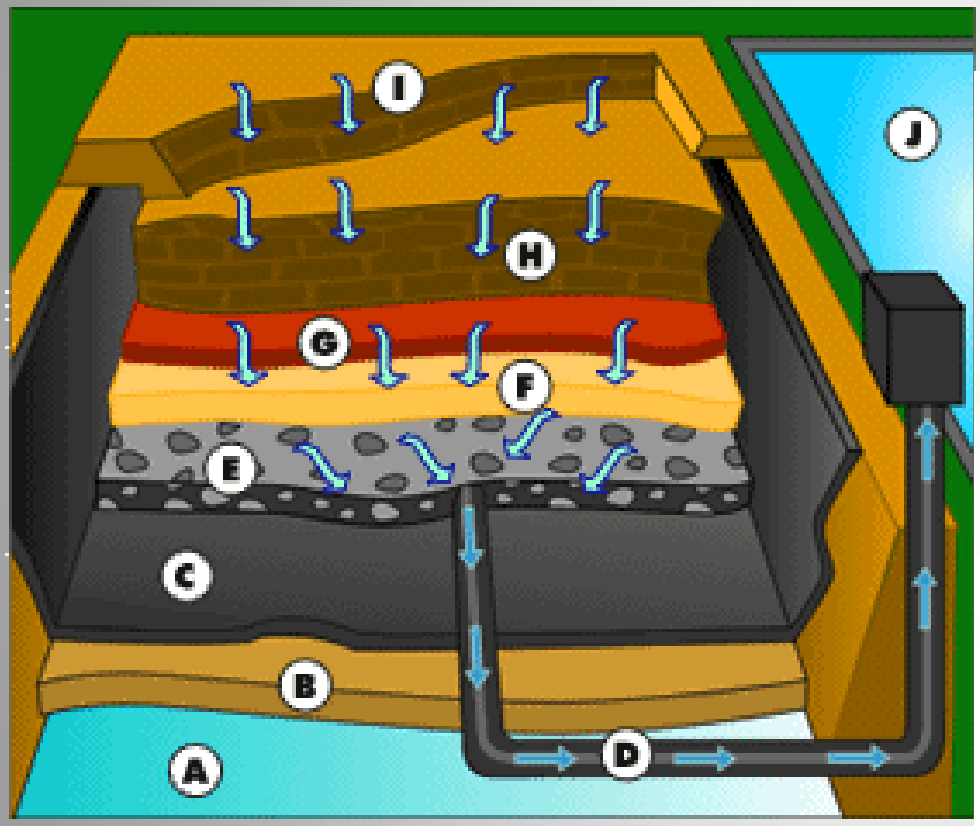
Written Plans:

- The *Plan of Operations* details procedures for routine daily operations.
- The *Contingency Plan* spells out measures for unusual events and emergency response.

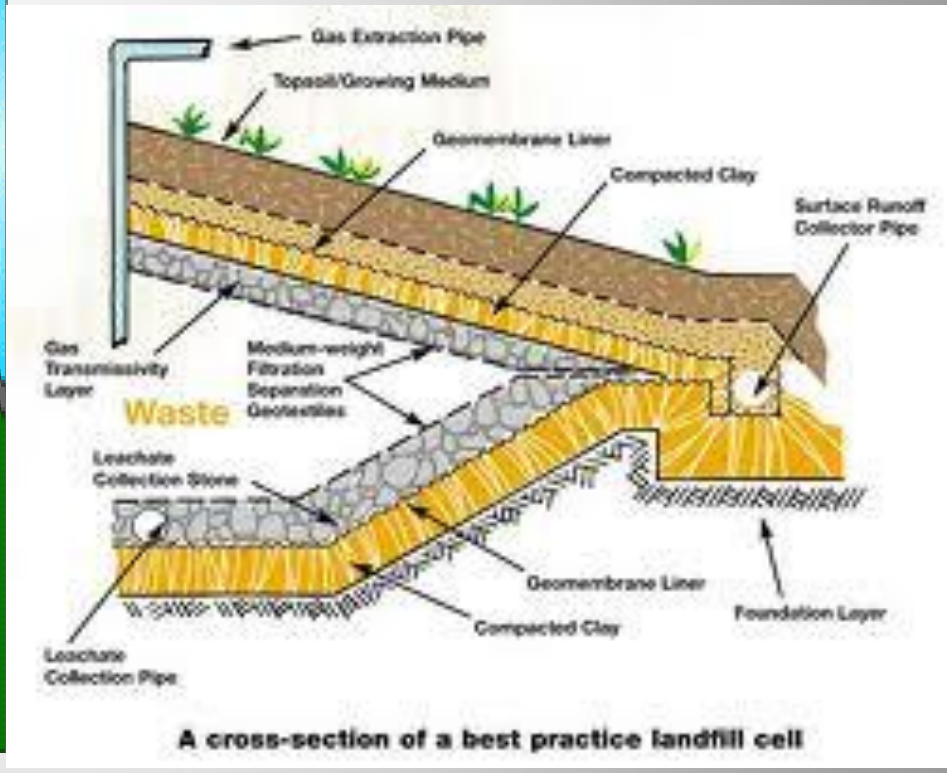
ALSO:

- Maintenance Plan
- Waste Screening Plan
- Stormwater Plan (SWPPP)
- Spill Plan (SPCC)
- Closure/Post-Closure Plan

Solid Waste Landfills are not just a "hole in the ground"



A: Ground Water
B: Clay
C: Plastic Liner
D: Leachate Collection Pipe
E: Gravel
F: Drainage Layer
G: Soil Layer
H: Old Garbage Cells
I: New Garbage Cells
J: Leachate Pond



A cross-section of a best practice landfill cell

What is the Federal Criteria? {*RCRA Subtitle D*}

Location Standards

Landfill Design & Construction Stds:

- ✓ Liner system(s)
- ✓ Leachate Collection
- ✓ Run-on & Run-off collection

Groundwater Monitoring System

Operating Requirements

Closure & Post-Closure Requirements

Financial Assurance & Insurance

Location Standards: 40 CFR §258.10-16

- Airport Safety (birds)
- Flood Plains
- Wetlands
- Fault Lines
- Seismic Impact Zones
- Unstable Areas

Other Siting Factors

- Waste Source(s)
- Logistics
- Land Use Planning
- Geology & Soil Types
- Surface & Ground Water

Tribal Lands:

- BIA Env. Assessment
- Tribal Govt. & Tribal Laws-Codes
- Public Acceptance

PERMITS?

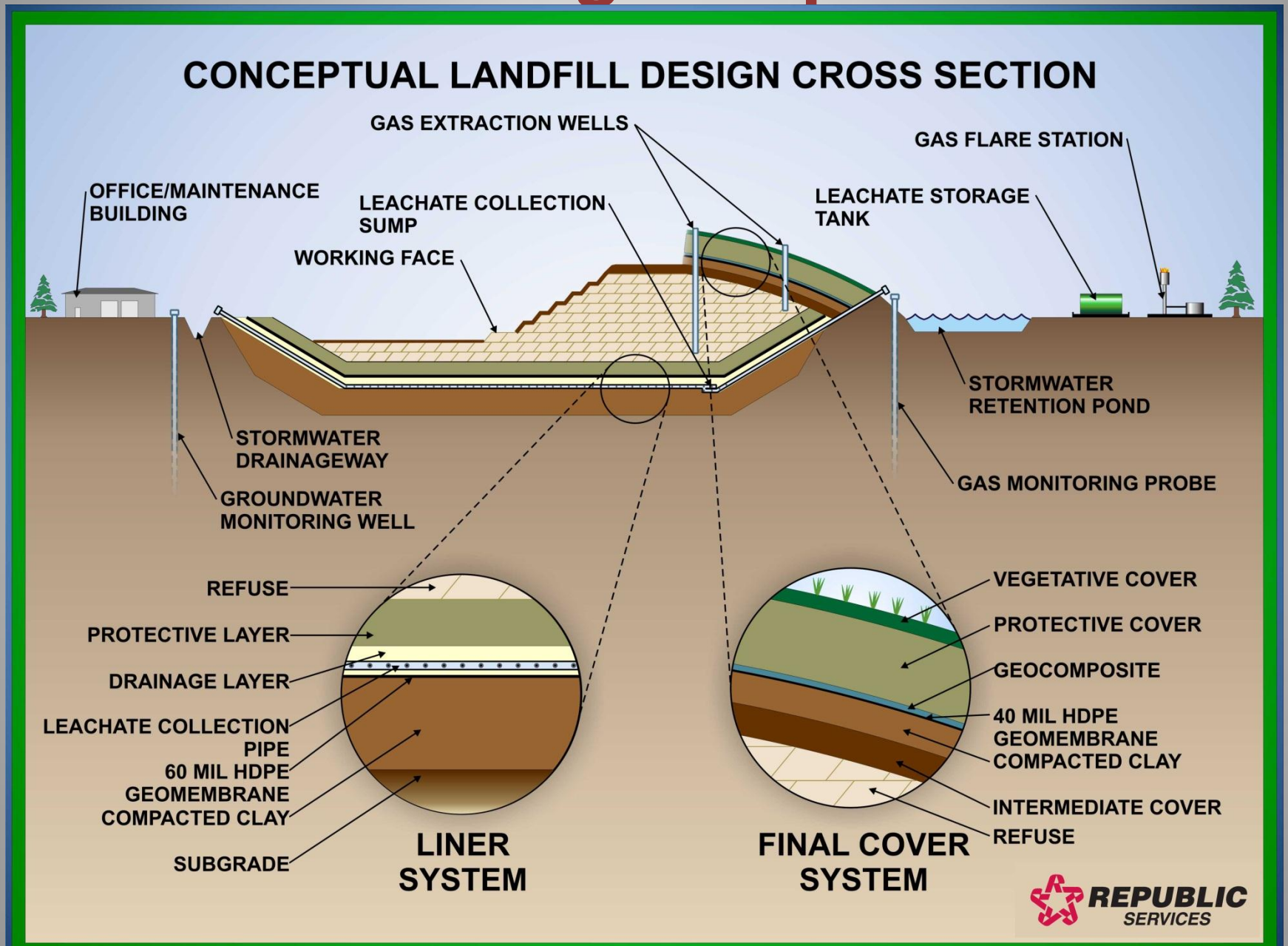
- No US EPA Permit Required (meet criteria)
- Tribal Permit?
- Tribal TERO Requirements
- BIA Review
- State Permit (Fee Land?)
- Army Corp?
- Other?

Landfill Operation Terms

- **Cell** – *volume placed in landfill in one day of operation*
- **Lift** – *series of cells connected horizontally across the landfill*
- **Bench*** – *placed at certain heights on final slope of landfill sides to increase stability and collect storm water from final cap*
- **Phase** – *constructed area for landfill operation that is lined and available for use*

**Note: the cells & lifts can go above the Bench level*

Landfill Design Requirements



Landfills are a Perpetual Construction Project

Plans:

- Existing Conditions Plan
- Site Development Plans
- Cross Sections (liners & systems)
- Final Contour Plans (cells & cap)
- Construction Details (total site operations)
- Operations & Management

Construction Specifications

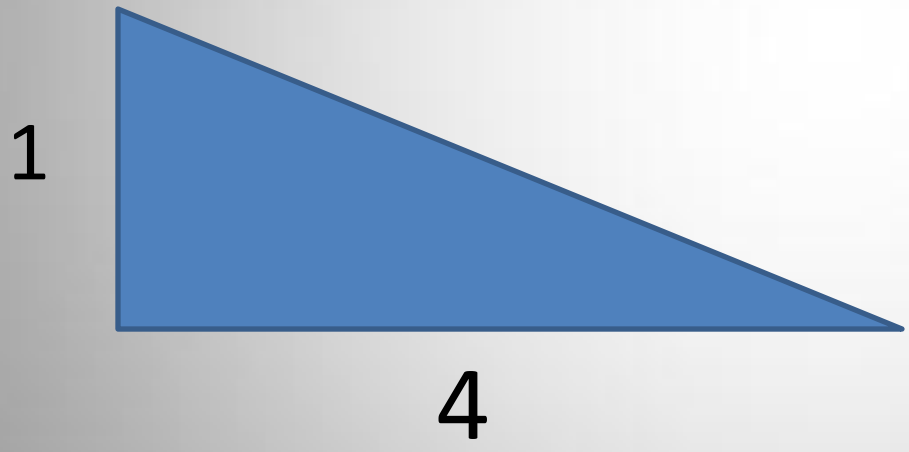
- Construction Instructions (methods & materials)
- Performance Criteria
- Design Standards (40 CFR Criteria & materials)
- Material/Product Specifications
- Installation Procedures (and restrictions)
- Construction QA/QC (3rd party?)

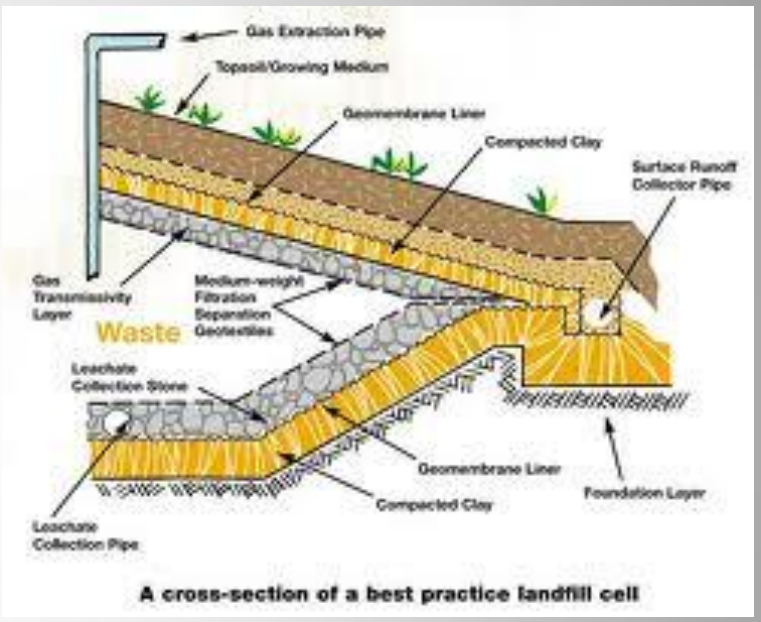
Note: who controls what? (sub-contractors)

Slopes are Critical

- Landfill Cell (inside & outside)
- Final Cover

Ratio = 4:1 (25%)





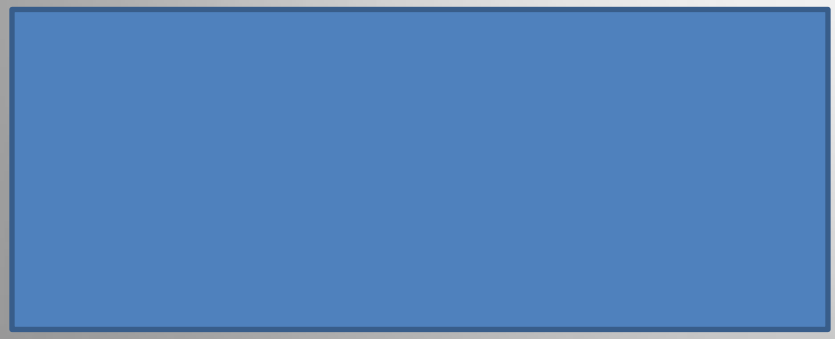
% Slope = Vertical/Horizontal X 100

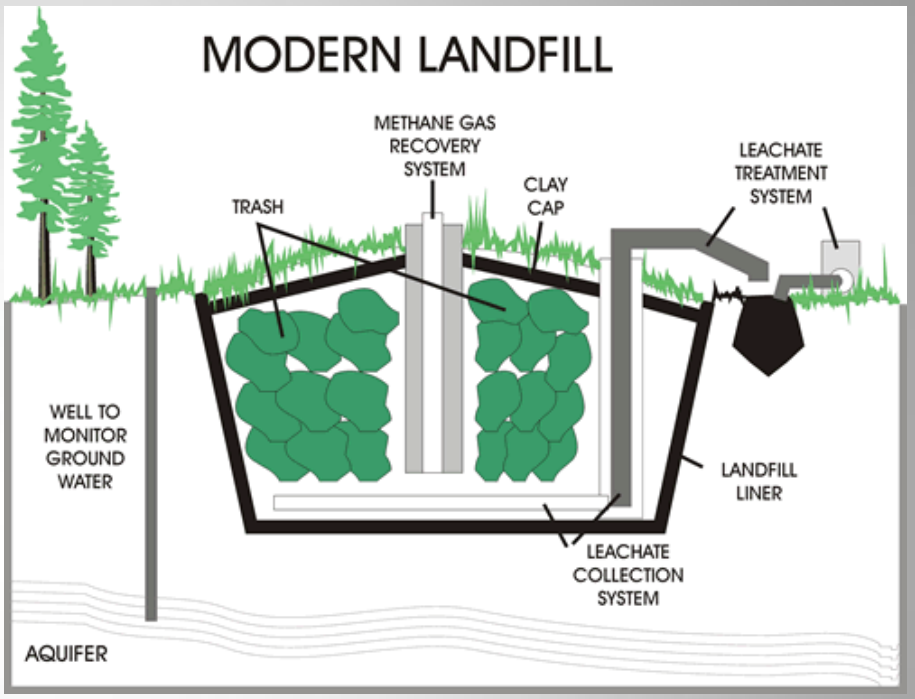
Landfill Volume = Landfill Life = $$$

Trapezoidal Area

X

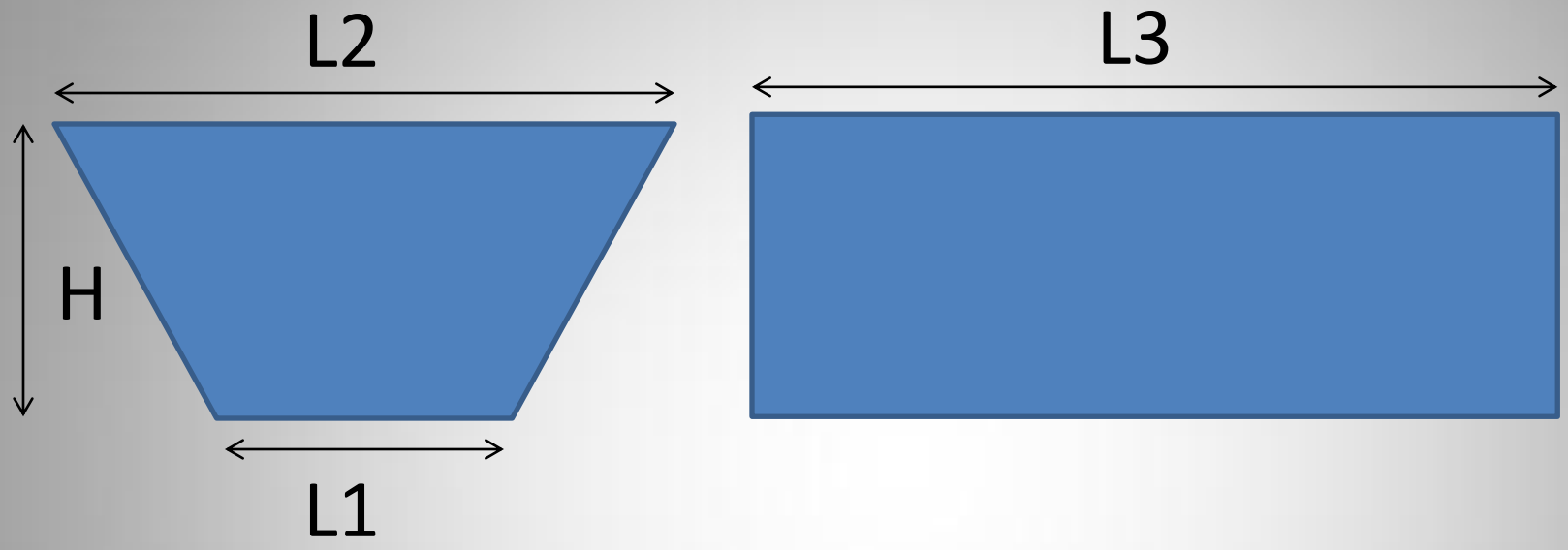
Horizontal Area





= Volume (cu. yds.)

Calculating Landfill Volume



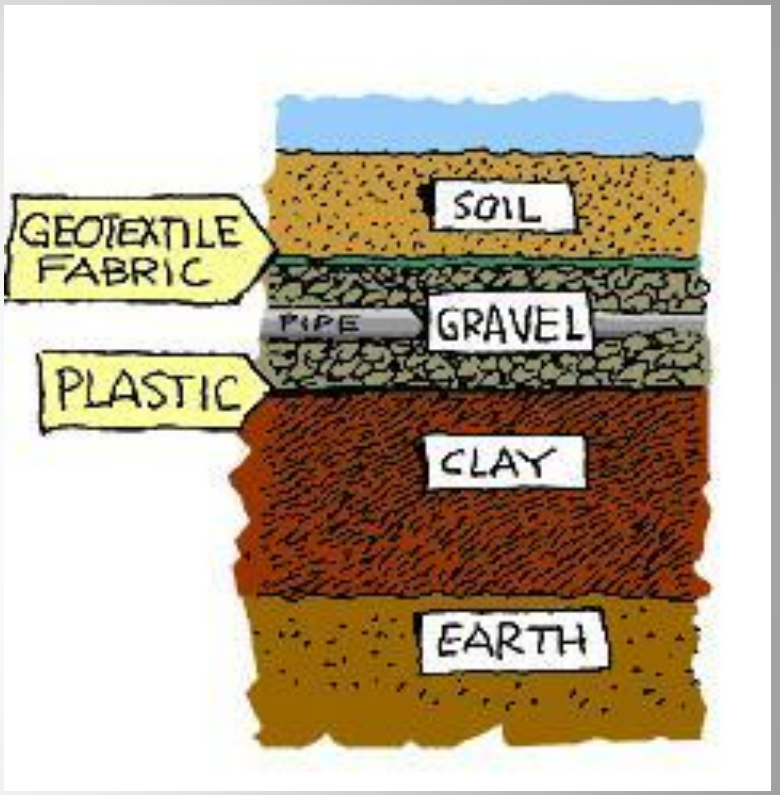
Volume = Area X Length (Cu. Ft. or Cu. Yds.)

Area = ½ (L1 + L2) X H

Length = L3

Liner Systems: Major Component

- **Compacted Clay**
- **Synthetic**
- **Geo-Textiles**

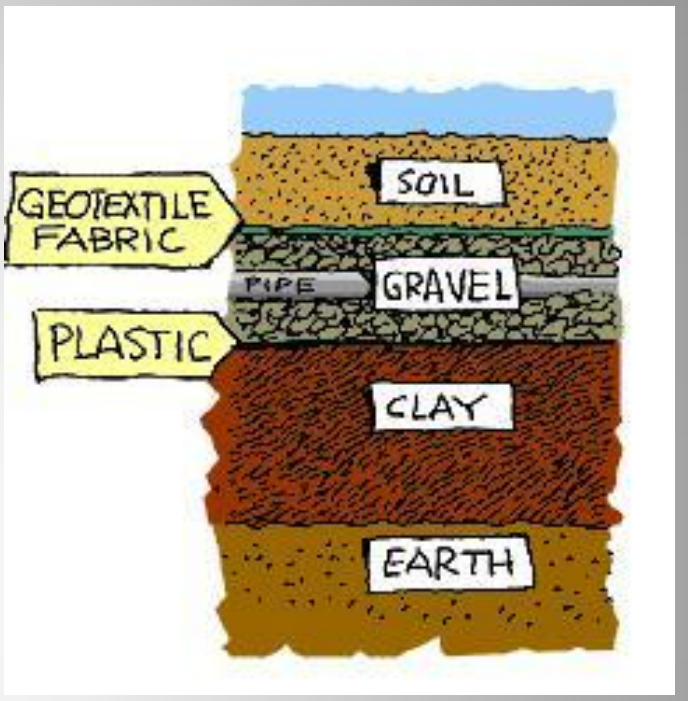


Factors to be considered:

- ✓ Local soil types & Stability
- ✓ Waste Types
- ✓ Climate & Season
- ✓ Material & Construction Costs
- ✓ Type of landfill operations

Liner Systems: Federal Std.

40 CFR §258.40



Composite Liner System

Prescriptive Specifications:

- ✓ Upper component minimum 30-mil flexible membrane liner (HDPE must be 60 mil.)
- ✓ Lower component at least 2 feet of compacted soil with hydraulic conductivity no more than 1x10-7 cm/sec.
- ✓ FML MUST installed in direct and uniform contact with the compacted soil component.

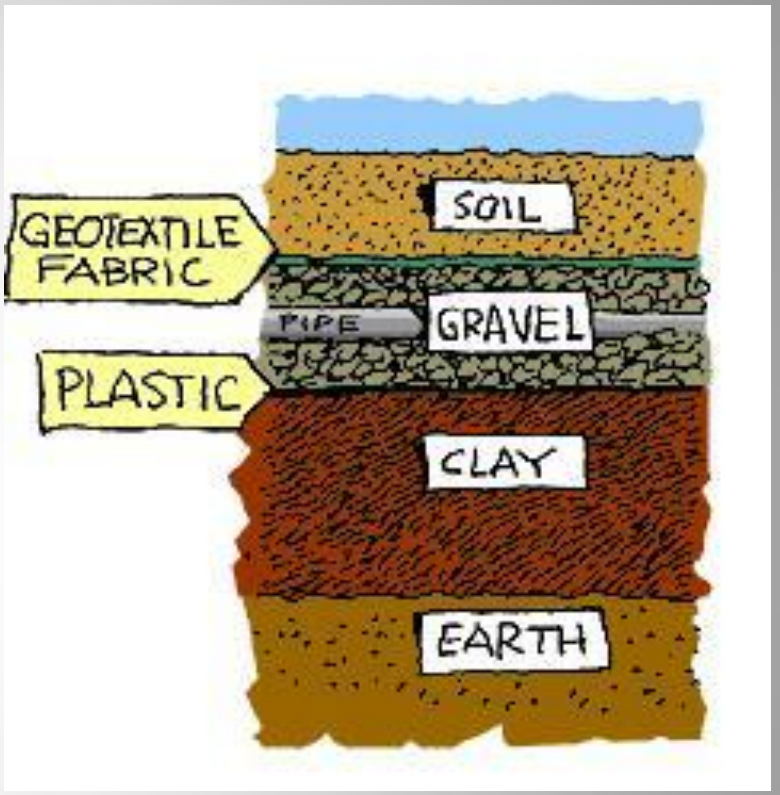
{Note: Check local State Standards}

Liner Systems: Natural Liners

Compacted Clay Layer

Factors to be considered:

- ✓ In-situ soils or imported?
- ✓ Permeability characteristics
- ✓ Soil density-compaction
- ✓ Soil layer thickness
- ✓ Characteristics of leachate



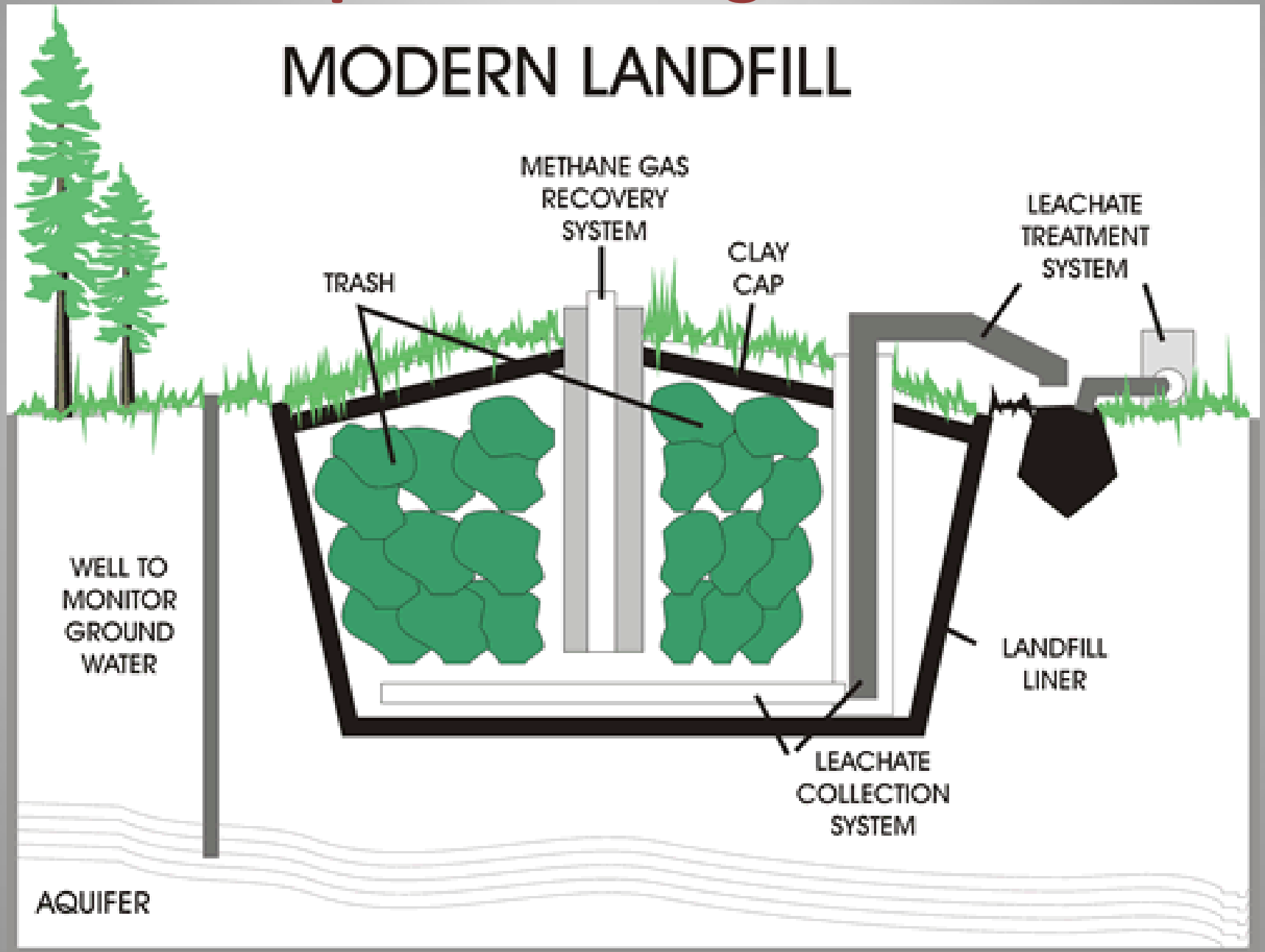
Construction Oversight Important

Synthetic Liner &
Geo-textile
Installation

Clay Liner Lifts
& Compaction
(1 X 10 -7)

“As Built” Plans Needed!

Liquids Management



Liquids Management

40 CFR §258.26

- ✓ Storm Water - Run On
- ✓ Storm Water - Run Off (inside & outside)
- ✓ Design for 25 yr./24 Hr. Storm Event
- ✓ Leachate Collection & Treatment required
- ✓ Final Cap & Cover – Erosion Control
- ✓ Conduct Groundwater Monitoring

LEACHATE

- ✓ Liquid that percolates thru the solid wastes and carries both soluble and insoluble constituents from the decomposing wastes.

Typical Leachate:

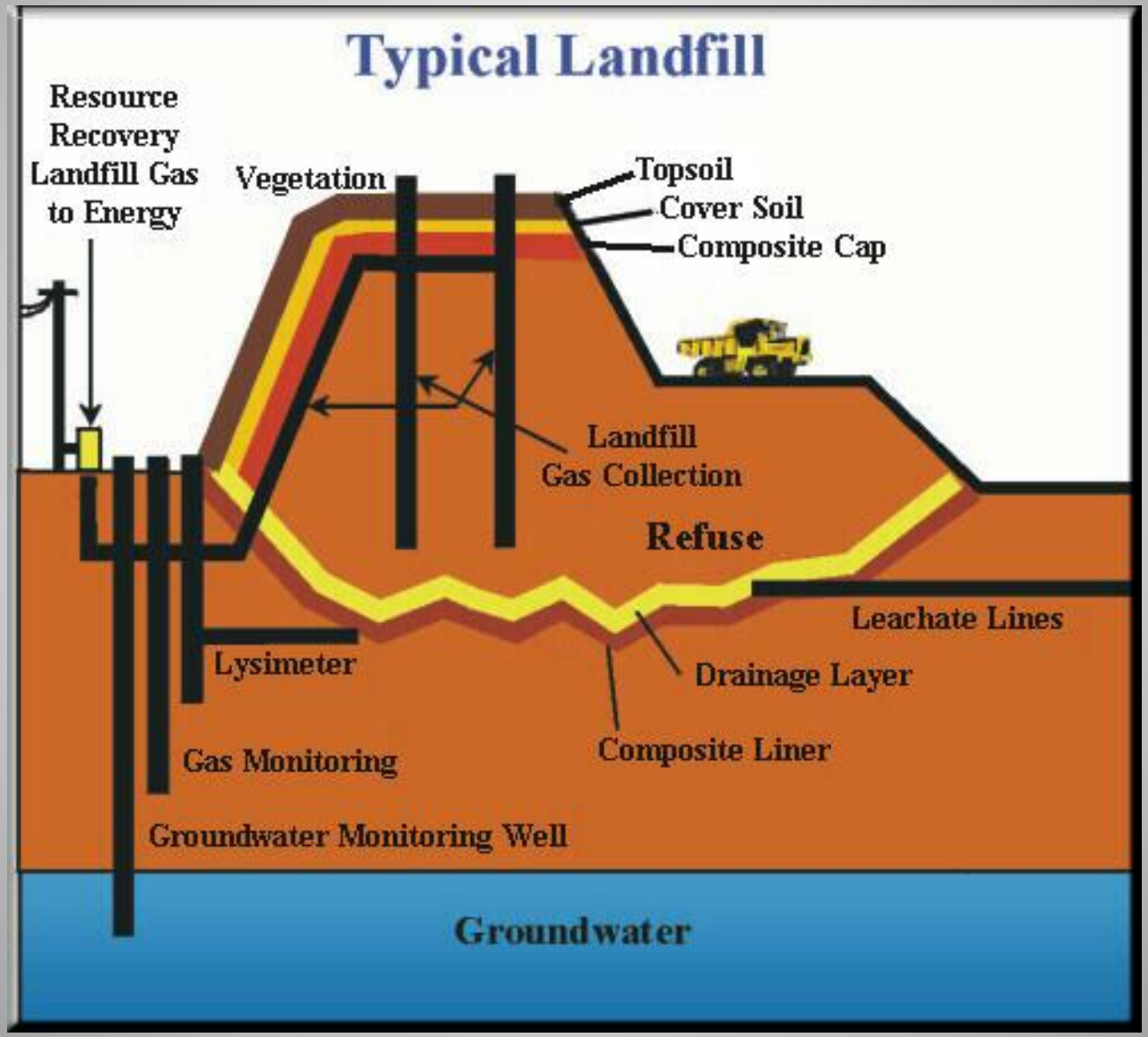
- BOD = 10,000 mg/l
- COD = 18,000 mg/l
- pH slightly acidic (about 6.0)
- Total Hardness = 3,500 mg/l
- Varies depending on wastes characteristics

Leachate Containment

Collection & removal systems must limit the depth of leachate over the top of the liner to about 30cm (*approx. 1 ft. of head*)

Note: the superior containment properties of synthetic liners are partially offset by the vulnerability of the materials to damage during construction or operation and seam failures.

Ground Water Monitoring



Ground Water Monitoring System

40 CFR §258.51

- Objective is to detect and measure releases of liquid contamination to the environment
- Minimum of 1 up-gradient (background) & 3 down-gradient monitoring wells
- Can also monitor the aquifer(s)
- Specific well construction requirements
- Specific sampling and analytical requirements

Ground Water Monitoring System

40 CFR §258.51

SOME TIPS:

- Request for bids should clearly specify “monitoring well” drilling & construction
- Bidders should have experience in monitoring well drilling & construction
- Cannot use muds to lubricate drilling – clogs the formation being monitored
- Well casing & screen materials is critical to avoid false data
- May want to include “well development”

Landfill Utilization Factors

- **Compaction Method (Baled vs In-Place)**
- **Compaction Efficiency (waste/unit volume)**
- **Daily Cover Type (soil vs other materials)**

LUF = Waste Weight ÷ Landfill Volume

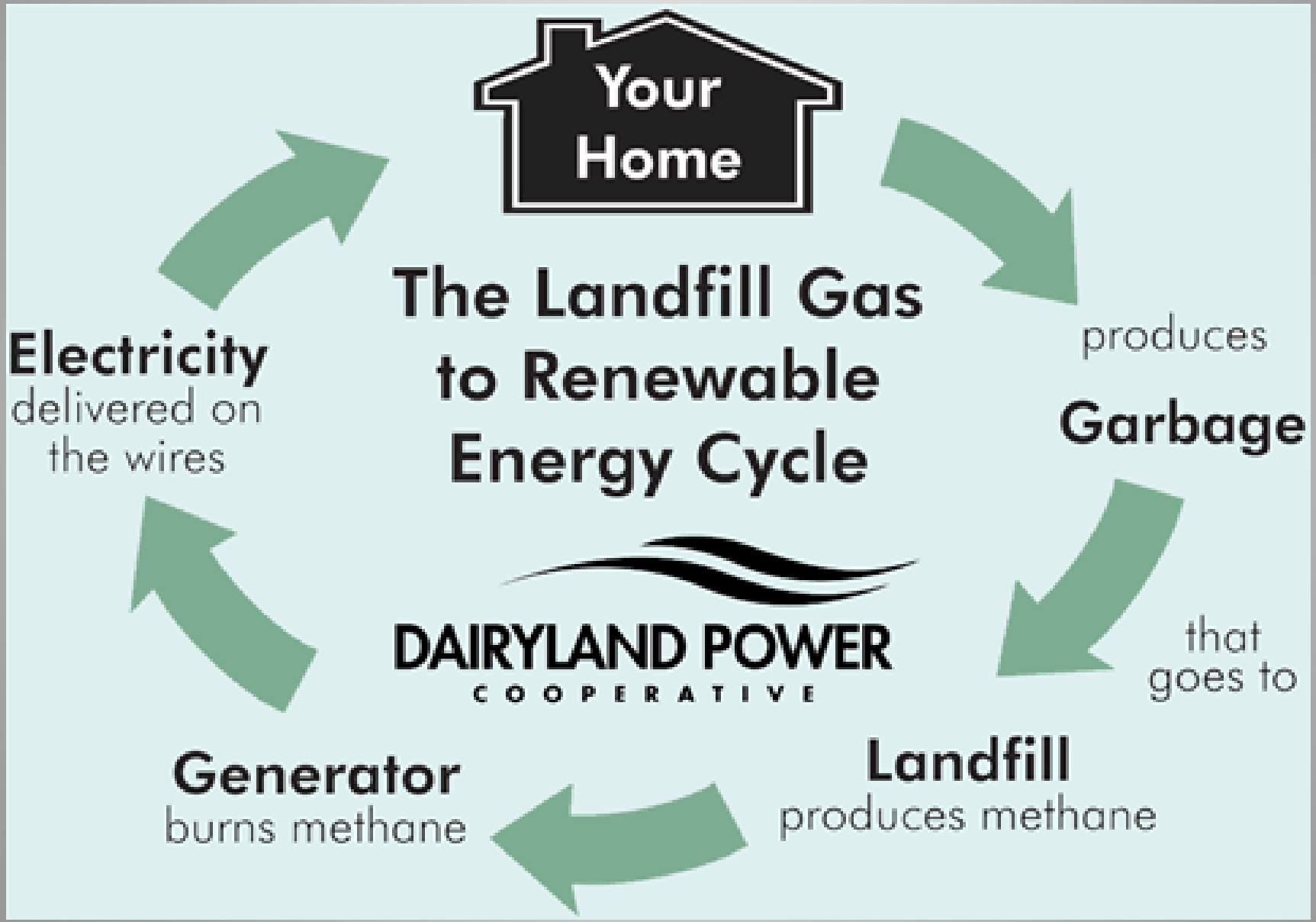
Annual LUF Calculation

- ✓ No. Cu. Yds Consumed (per year)
- ✓ No. Tons (over the scale) (per year)

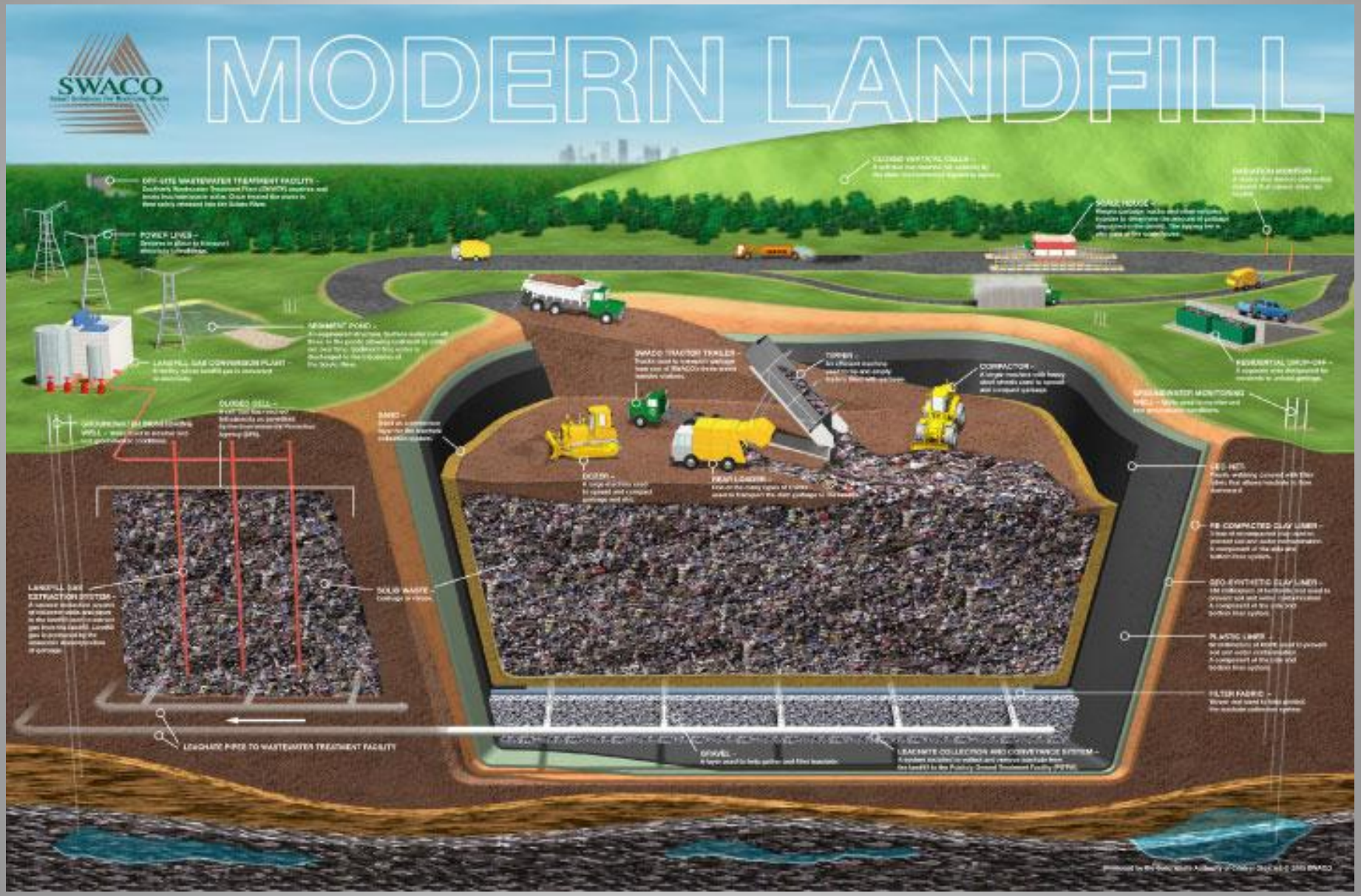
$$\text{LUF} = \frac{\text{Tons (2,000 lbs/Ton)}}{\text{Cu. Yds.}} = \text{Lbs/Cu. Yd.}$$

LUF should be at least 1,000 lbs/cu. Yd.

Landfill Gas (got a market?)



A Landfill is a SYSTEM



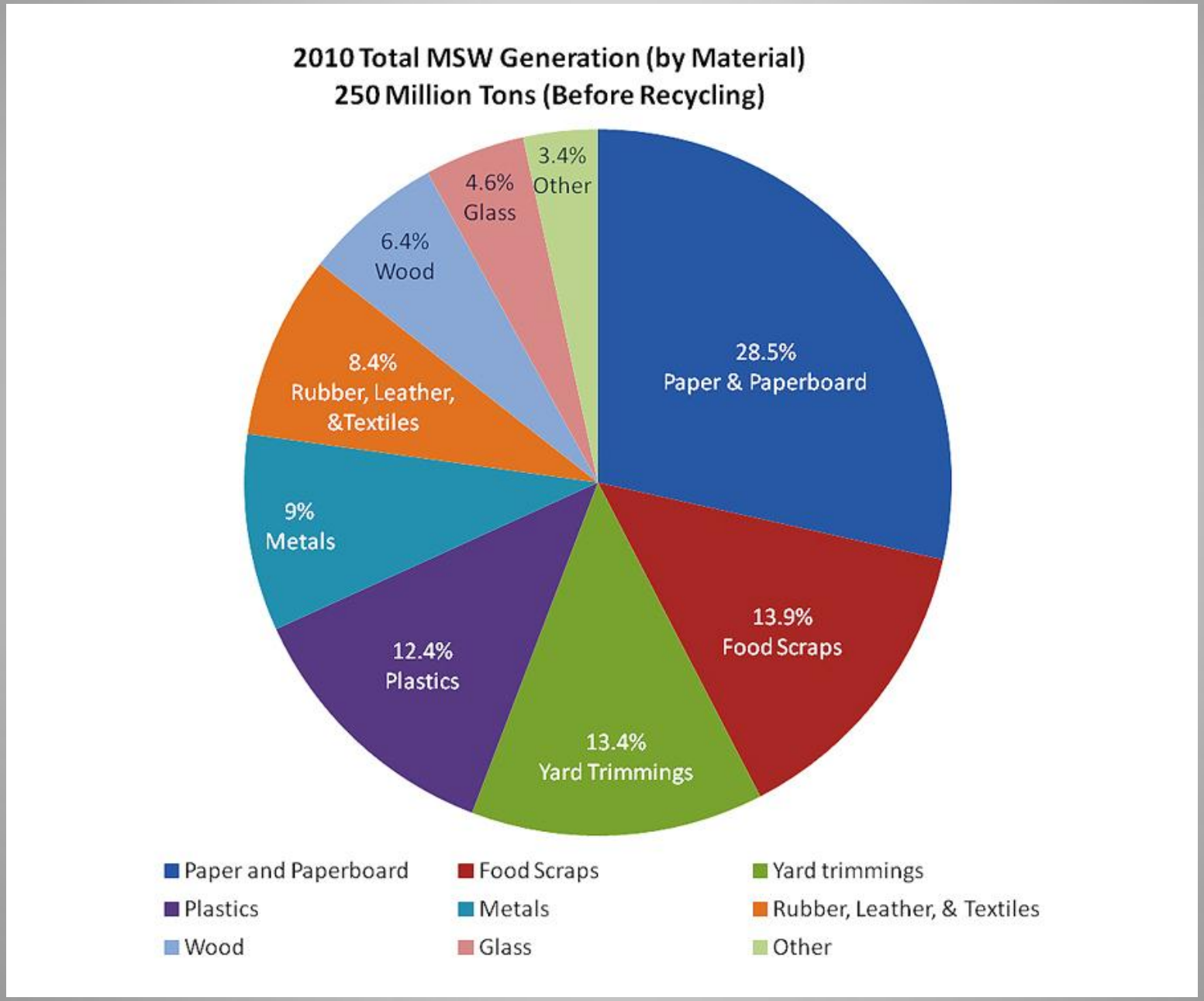
Solid Waste Funding $$$$$$

- Collection Fees
- Commercial Services
- Drop-off Fees
- Recycling Revenue &
- Waste Diversion/Conversion Savings
- Tribal Govt. Subsidy
- IHS (SDS Funding)
- USDA-Rural Development Grant/loans

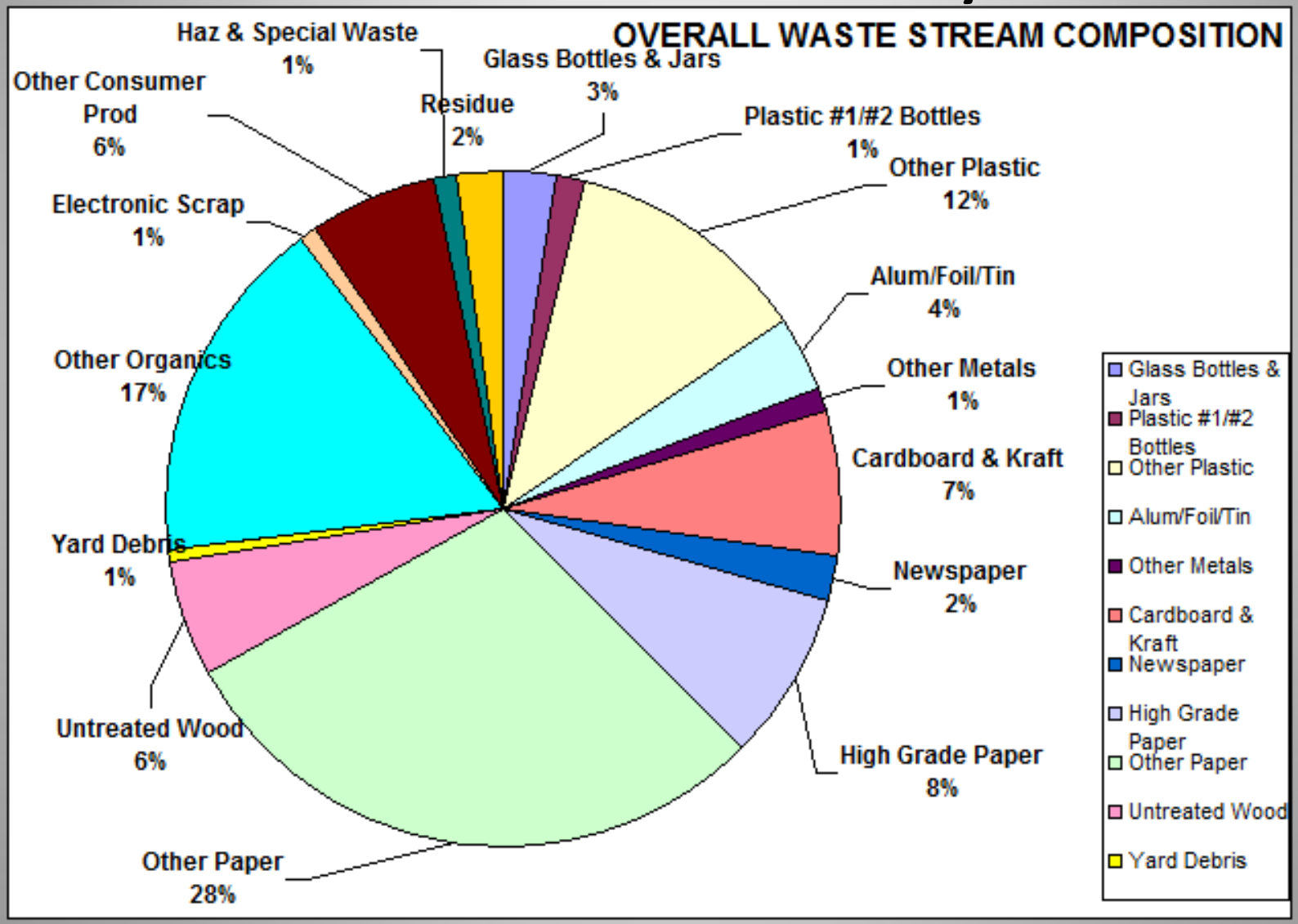
Solid Waste Expenses $$$$$

- ✓ Equipment & Maintenance
- ✓ Fuel
- ✓ Salaries
- ✓ Containers
- ✓ Disposal “Tipping Fees”
- ✓ Training
- ✓ Recycling
- ✓ Xfer Station and/or Landfill??

US EPA National Waste Data - 2010



Wind River Tribes, WY
Waste Stream Study 2006



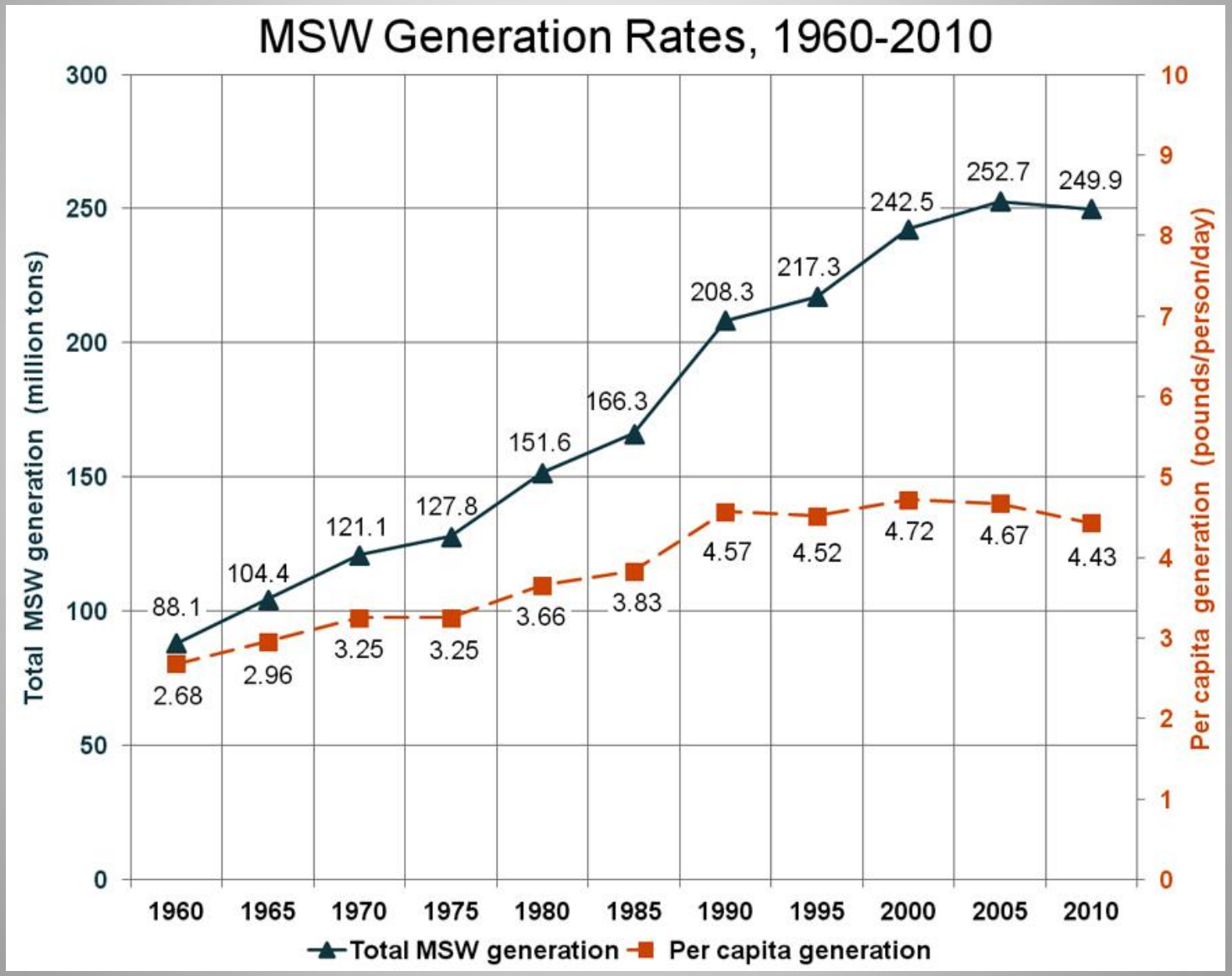
Standing Rock Sioux Tribe 2002 Waste Sort Study

2,014 pounds of municipal solid waste included in a 2002 study:

- 66% was identified as residential;
- 33% identified as commercial or institutional

Paper	28.80%
Glass	7.50%
Metals	8.40%
Plastics	14.30%
Organics	39.50%
Inorganics	1.40%

Waste Generation: per capita



Waste Generation: Calculation

- Assumption = Xlb. Of MSW/person/day
- Operate Landfill 6 days/week
- tons/day = $\frac{\text{population x (Xlb.)}}{\text{2,000 lbs/ton}}$

Avg. tons/day = $\frac{\text{(7 days) x (tons/day)}}{\text{6 days}}$

NOTE: Generally Reservation MSW/per capita is lower than the national average.

More Recycling Needed

- Aluminum cans
- Scrap Metal
- Car Batteries
- Cardboard
- Paper
- Plastics
- E-Wastes
- Used Motor Oil
- Used cooking oil
- Composting

Solid Waste Training

Tribal Solid Waste Education and Assistance Program

Institute for Tribal Environmental Professionals
PO Box 15004
Flagstaff, Arizona 86011
http://www.nau.edu/itep/

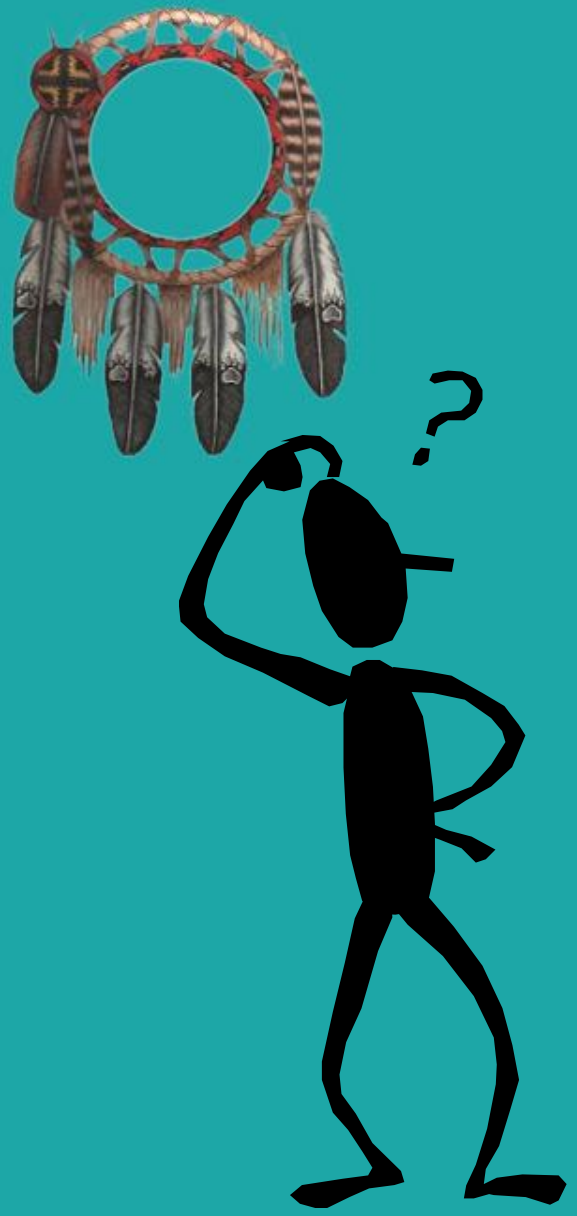
*"**Addressing and Managing Illegal Dumps in Indian Country**" course in **Denver, Colorado, July 17-19, 2012**.*
This course will provide guiding principles in the identification, regulation, and closure of illegal dumps on tribal lands.

#1 way to prevent waste?

Teach children how to prevent waste, recycle and conserve our resources so we have more to work with in the future.

QUESTIONS ?

COMMENTS?



Huh? Did you say something?