2018 Tribal lands and Environmental Forum - Landfills and Transfer Stations

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Landfill Overview -

- What types of landfills are there?
- What are the types of waste allowed in MSW landfill?
- What are the requirements to operate an MSW landfill?
- What are the components of an MSW landfill?
- Why would I want an MSW landfill on tribal lands?
- What are the risks?
- Are there ways to maximize profits?
Types of Landfills -

There are different kinds of landfills that accept different material including:

- Municipal Solid Waste (MSW) – the trash and garbage that we throw away every day at home, work and school.

- Construction and Demolition (C&D) debris, (including land clearing)

- Hazardous waste landfills

- Industrial waste landfills
What are the types of waste allowed in MSW landfill?

In- Garbage, refuse, sludge from a waste water treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations.

Out- Liquid wastes (bulk) that is not from a household. Radioactive wastes. Regulated hazardous waste. Rainwater (run-on and run-off controls).
What are the requirements to operate an MSW landfill?

The Federal regulations for Landfills covers the six basic areas:

- Location Restrictions
- Operating Criteria
- Design Criteria
- Groundwater monitoring and corrective action
- Closure and post-closure care (30 years)
- Financial assurance
The basic parts of a landfill are:

- **Bottom liner system** - separates trash and subsequent leachate from groundwater
- **Cells (old and new)** - where the trash is stored within the landfill
- **Storm water drainage system** - collects rain water that falls on the landfill
- **Leachate collection system** - collects water that has percolated through the landfill itself and contains contaminating substances (leachate)
- **Methane collection system** - collects methane gas that is formed during the breakdown of trash
- **Covering or cap** - seals off the top of the landfill
Why would I want an MSW landfill on tribal lands?

- $$$ - Tipping Fees, Returns on recycled material, Spend less on open dump cleanup.

- Jobs - landfills encompasses a wide range of job types, including garbage collectors, truck drivers, heavy equipment operators, engineers of various disciplines, specialized technicians, executives, MSW department directors, administrative staff, weigh scale operators, salespersons, and landfill operations managers.

- Economic stability – Local contracts, Casino waste streams,
What are the tipping fees?

<table>
<thead>
<tr>
<th>Region</th>
<th>Average Tipping Fee</th>
<th>2016</th>
<th>2017</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast</td>
<td></td>
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<tr>
<td>(CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT, VA; WV)</td>
<td>$58.20</td>
<td>$67.27</td>
<td>+$9.07</td>
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<td>Pacific</td>
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<tr>
<td>(AK, AZ, CA, HI, ID, OR, WA)</td>
<td>$61.20</td>
<td>$60.20</td>
<td>-$1.00</td>
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<td>Midwest</td>
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<td>(IL, IN, IA, KS, MI, MN, MO, NE, OH, WI)</td>
<td>$39.64</td>
<td>$50.27</td>
<td>+$10.63</td>
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<tr>
<td>Mountains/Plains</td>
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<tr>
<td>(CO, MT, ND, SD, UT, WY)</td>
<td>$43.38</td>
<td>$45.84</td>
<td>+$2.46</td>
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<td>Southeast</td>
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<td>(AL, FL, GA, KY, MS, NC, SC, TN)</td>
<td>$44.46</td>
<td>$41.01</td>
<td>-$3.45</td>
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</tr>
<tr>
<td>South Central</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(AR, LA, NM, OK, TX)</td>
<td>$36.34</td>
<td>$36.94</td>
<td>+$0.60</td>
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<tr>
<td>National Average</td>
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</tr>
<tr>
<td></td>
<td>$48.27</td>
<td>$51.82</td>
<td>+$3.55</td>
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</tr>
</tbody>
</table>
Salt River Landfill
What are the risks?

Environmental-
- Groundwater contamination from a leaking liner system.
- Landfill gas (methane) capture problems.

Financial-
- No long-term agreements
- High repair/operating costs
Ways to Maximize Profits

Management-
• Recycling
• Composting

Operations-
• Higher compaction rates
• Proper size equipment selection
• Waste placement techniques
How does a landfill work?
Drain design configurations

“Saw-tooth” configuration:

Continuous slope configuration:
Leachate Collection System with Saw Tooth Drain Design
Leachate Removal System
1. Wellbore Casing/refuse interface
2. Desiccation cracks made by tree roots, etc.
3. Landfill refuse/natural interface
4. Caves or cavities that are man-made or formed as a result of weathering or erosion
5. Strata that consist of loose, permeable material such as gravels, etc.
6. Man-made conduits consisting of old shafts or utility lines.
7. Underground utility conduits
8. Surface fissures due to surface run-off
Gas Collection System

The Wells
Suction from the purification plant and flare stations draws the gas into the well via holes at the bottom of the well casing. It then goes through a collection riser into underground lateral pipes and on to the plant or stations.
Gas Flare
Electric Generation
Lift and Cell Structure
Good Landfill Practices

Some areas that we can establish good practices are:

1) Siting
2) Landfill Cell Design
3) Construction QC
4) Waste Disposal
5) Waste Receipt
6) Monitoring
7) Reporting
8) Community Involvement
9) Financial Assurance
Regulations Cover Six Basic Areas (40 CFR 258)

The Federal regulations for Landfills covers the six basic areas:

• Location Restrictions
• Operating Criteria
• Design Criteria
• Groundwater monitoring and corrective action
• Closure and post-closure care (30 years)
• Financial assurance
Operational requirements for landfills under 40 CFR 258 will include:

1. Ensure that hazardous waste is not accepted.
2. Provide daily cover for the waste disposed.
3. Control on-site disease vectors such as insects and rodents.
5. Eliminate noxious open burning of waste.
6. Control public access to the facility.
7. Construct run-on and run-off controls.
8. Control discharges to surface water.
9. Prohibit the disposal of most bulk or non-containerized liquids.
10. Keep operating records that will demonstrate regulatory compliance.
Groundwater Monitoring

- Sampling and analysis must be done at least twice a year.
- If contamination detected above MCL:
  - Must begin assessment monitoring.
  - May make determination that landfill is not source.
  - If source, must take “corrective action”
    - Evaluate alternatives
    - Public comment
    - Clean up to drinking water quality or background levels.
    - Corrective action continues for 3 yrs after standard met.
Closure & Post Closure Care

- Closure must begin within 30 days of final receipt of waste.
- Closure must be completed in accordance with closure plan within 180 days, certified by engineer.
- Install final cover to minimize infiltration & erosion.
  - Infiltration layer: equal to bottom and side liner protection; 18 in of material, e.g., compacted clay and/or synthetic flexible membrane liner (FML); permeability ≤ bottom liner or no > $1 \times 10^{-5}$ cm/s, whichever is less.
  - Erosion layer: minimum 6 inches of soil capable of sustaining native plant growth
- Notation must be placed in land deed (limits future use).
Subtitle D “Systems” Approach to Post-Closure Care (40 CFR 258.61)

1. LCRS Operation and Maintenance
   - Leachate Recirculation
   - Primary and Secondary LCS

2. Gas Migration Control/Monitoring
   - Gas Wells
   - Gas Probes

3. Groundwater Monitoring
   - Groundwater Monitor Wells

4. Cap Maintenance And Monitoring

Other Factors:
- Surface Water Monitoring
- Perimeter Security
- Grounds Maintenance
Landfill Questions?
Transfer Stations - Community Transfer Station
Transfer Station Overview -

- What is a transfer Station?
- Why use a Transfer Station?
- How to estimate the size of a transfer Station
- Other Tribal Transfer Station Accomplishments
- How can we afford a Transfer Station?
What is a Transfer Station-
Why use a Transfer Station?

- Most Tribes Reside in Rural Area
- Low Population Density
- High Cost of Waste Disposal
- No Local Waste Hauler Service
- Open Dumping/Burning
- Adverse Impact on Human Health and Environments
How to Estimate the Size of a Transfer Station

What to consider when:
- Starting a locally operated collection service
- Building a municipally operated transfer station
- Building a municipal solid waste landfill

<table>
<thead>
<tr>
<th>Step 1: Determine what the tribe currently pays for waste collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of households or residential units within the service area</td>
</tr>
<tr>
<td>Current waste-hauling/disposal cost for the tribal government per household</td>
</tr>
<tr>
<td>Number of offices, businesses, and government facilities within the service area</td>
</tr>
<tr>
<td>Current waste-hauling/disposal cost to the tribal government per facility</td>
</tr>
<tr>
<td>Total yearly cost of current system to the tribe</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2: Determine what a locally owned collection system would cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cardboard bins needed</td>
</tr>
<tr>
<td>Cost per cardboard bin</td>
</tr>
<tr>
<td>Number of commingled or roll-off bins needed</td>
</tr>
<tr>
<td>Cost per commingled or roll-off bin</td>
</tr>
<tr>
<td>Number of additional collection vehicles needed</td>
</tr>
<tr>
<td>Cost per collection vehicle</td>
</tr>
<tr>
<td>Other equipment or overhead costs</td>
</tr>
<tr>
<td>Total initial cost</td>
</tr>
<tr>
<td>Miles collection vehicle will travel per week</td>
</tr>
<tr>
<td>Cost of gas per mile</td>
</tr>
<tr>
<td>Cost of maintenance, repairs and insurance per mile</td>
</tr>
<tr>
<td>Operating cost per year</td>
</tr>
<tr>
<td>Administrative staff hours needed per week</td>
</tr>
<tr>
<td>Cost per hour administrative staff time</td>
</tr>
<tr>
<td>Solid waste technician hours needed per week</td>
</tr>
<tr>
<td>Cost per hour solid waste technician</td>
</tr>
<tr>
<td>Tipping fees per month</td>
</tr>
<tr>
<td>Other costs per month</td>
</tr>
<tr>
<td>Total operating cost per year</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 3: Include User Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly fee charged to households for service (if any)</td>
</tr>
<tr>
<td>Monthly fee charged to tribals businesses for service (if any)</td>
</tr>
<tr>
<td>Monthly fee charged to local businesses for service (if any)</td>
</tr>
<tr>
<td>Total yearly revenue from collection program</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 4: Determine when the new collection system will break even with what the tribe pays currently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payback period (in years) with no fee charged and no recycling/recovery</td>
</tr>
<tr>
<td>Payback period (in years) with fee charged and no recycling/recovery</td>
</tr>
<tr>
<td>Payback period (in years) with fee charged and recycling/recovery</td>
</tr>
</tbody>
</table>

Use this worksheet only when the tribe pays for waste collection based on number of households and businesses (Page 6 of 6). Copy upper rows in the gray shaded areas.
Costing tool -

Helps answer the big question- Should my tribe start a tribally-operated collection service?

Step 1- Determine what the tribe currently pays for waste collection.

Step 2- Determine what a tribally-owned collection service would cost.

Step 3- Include user fees.

Step 4- Determine if a new collection system would break even with current costs.
Waste Flow-

Transfer Station
- Reuse/Recycling
- Food Waste/Composting
- Hazardous Waste
- Electronics, etc.

Collection

Waste Generator
- Household
- Business

Collection

Landfill

Hauling

Disposal
Economic Feasibility Study

5 Steps for TS with Tribal Hauling

1. Subsidy (A): Tribe Currently Pays for Waste Collection
2. Initial Cost (B): Construct Collection System
3. Operating Cost (C): Operate Collection System
4. Revenue (D): User Fee & Recycling Revenue
5. Distance (E): from Waste Source to Disposal Site

• Payback Period Calculation (T)

\[ T = \frac{B}{A + D - C} \]
Economic Feasibility Study

**Break-even Distance**

Cost of Direct Hauling per Ton: \( Yd = \frac{E_4 \times X}{E_2} \)

Cost of TS Hauling per Ton: \( Yt = E_1 + \frac{E_4 \times X}{E_3} \)

At Break-even Distance, \( X = \frac{E_1 \times E_2 \times E_3}{2 \times E_4 \times (E_3 - E_2)} \)

- **E1**: Cost per ton of waste to build, own & operate transfer station
- **E2**: Average payload of collection truck hauling directly to landfill
- **E3**: Average payload of transfer truck hauling from TS to landfill
- **E4**: Average trucking cost per mile driven
Economic Feasibility Study

Break-even Distance Example

E_1 = $10/ton
E_2 = 7 tons
E_3 = 21 tons
E_4 = $3/mile

X = 35 miles (round trip)
Tribal Solid Waste Program – Costing Tool

- A useful Tool to Assess Economical Feasibility of Building a Tribal-operated Collection System and/or Transfer Station.
- User Inputs Critical to further Improve this Costing Tool.
Questions?

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