Halifax 101

Presentation to New and Emerging Technology Advisory Group

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(Revised June 16, 2004 to reflect Questions and Answers)

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Introduction

Why am I Here Today?

- To present information about Halifax's MBT facility
- To discuss it's applicability for Toronto
- To offer my opinions and listen to yours
- To answer questions

Why Halifax?

- Because Halifax is regarded as a leader in waste diversion
- Because Halifax has a residual waste processing facility utilizing MBT, which is of interest to the City

Discussion

- What is MBT?
- Why use MBT?
- History of MBT at Toronto
- My Research
- Halifax’s Otter Lake Facility
- Other MBT Examples
- How can MBT be used in Toronto?
- Approvals
- Questions

Mechanical Biological Treatment

Definition:

- **MBT** (Mechanical Biological Treatment) and **BMT** (Biological Mechanical Treatment) refer to waste processing facilities that utilize a combination of mechanical and biological processes to treat waste
- A biological conversion process with pre and/or post conversion physical processing

Common Uses for MBT:

- **Recover material (recyclables, organics)**
- **Remove HHW**
- **Reduce moisture and organic matter content of waste**
- **Reduce quantity of waste landfilled**
- **Reduce environmental impacts of waste landfilled**
- **Produce raw material for industry (biogas, methanol, RDF)**

Why use MBT?

There are three primary reasons for using MBT:

- Benefits realized at the plant
- Downstream benefits
- To meet legislated requirements

History of MBT at Toronto

- **1977-1987** - Experimental Resource Recovery Plant (Dufferin)
- **1997** - RFP for Dufferin facility (SSO/MSW)
- **1999** - RFP for TIRM diversion (SSO/MSW)
- **1999 - 2001** - MBT research (SSO/MSW)
- **2001** - Task force report changed our focus to SSO
- **2004** - EA for RMSW management
    - MBT will be considered as an option

Literature Review

- Considerable body of research on MBT
- Will refer to literature through the presentation

Site Visits to MBT Facilities

- Conporec (Sorel-Tracy, Quebec)
- Edmonton
- Guelph
- Dufferin
- Caledon
- Landfills
- Colleague visited Otter Lake

Halifax Otter Lake Overview

Tonnages for 112,000 Halifax households receiving curbside collection (2000 GAP):

- 112,319 tonnes per year generation
- 10,661 tonnes (9.5%) diverted directly through at-home and stewardship programs
- 46,876 tonnes (41.7%) processed through source separation for 38.3% contribution to overall diversion
- 54,782 tonnes (48.8%) processed at Otter Lake for 8.8% contribution to overall diversion
- Overall diversion 56.6%

The Otter Lake facility includes:

- Front end mechanical processing
- Biological stabilization unit (aerobic composting)
- Landfill

The Otter Lake facility, which began operations in 1999, was developed with the primary purpose of reducing the amount of moisture and readily degradable organic matter in the waste prior to landfilling. It was not intended to be a diversion facility.

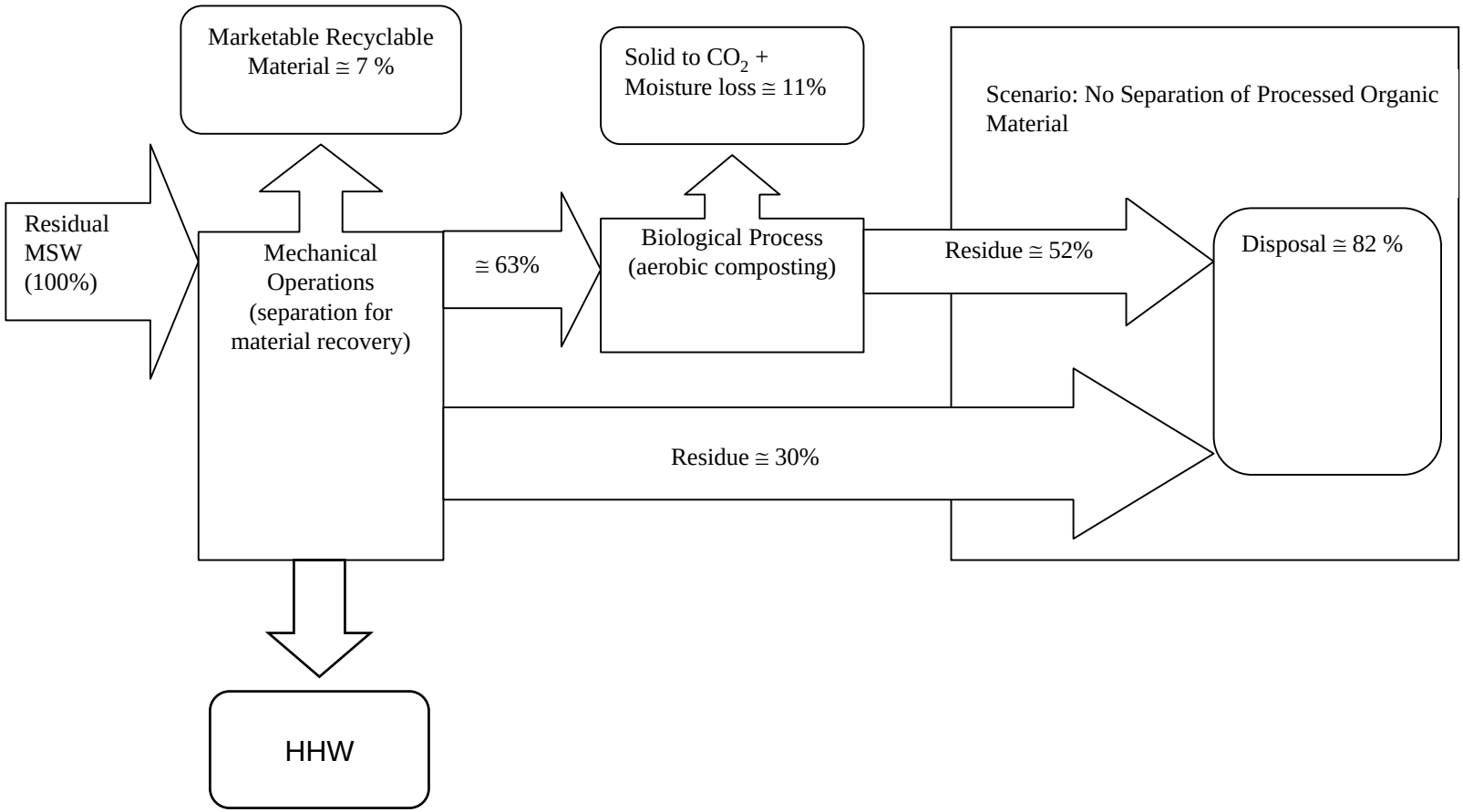
Primary benefits include:

- Reduction in readily degradable organics and moisture.

Secondary benefits include:

- *9% diversion* (recyclables, organics, moisture)
- Reduction in amount of HHW in waste

Otter Lake MBT Facility



*Based on 2000 GAP data

Otter Lake Mechanical Processing

- Waste is spread on the tip floor
- Bulky items (sofas, carpets, etc.) are taken to landfill
- Scrap metal is recovered (5.3% of feed / 2.5% of total waste generated)
- Waste is inspected for obvious hazards
- Waste goes through a bag breaker
- Then a 6” trommel screen and 2” trommel screen in series
- “**Unders”** go to biological stabilization facility
- “**Overs”** go to manual picking stations
    - Deposit return containers (0.2% of feed / 0.1% of total waste generated)
    - Marketable recyclables (1.5% of feed / 0.7% of total waste generated)
    - Removal of some HHW
    - Balance to landfill

- **Total diversion** in front end processing is 7% of feed / 3.3% of total waste generated
- **Consistent** with literature
- **Consistent** with others’ experience
- **Consistent** with our experience

Otter Lake Biological Processing

- 2 reactors with minimum 18 day retention time to meet Provincial requirement
- 11% of feed / 5.5% of total waste is diverted through evaporation and biological conversion (solids to CO_2)
- Balance (partially stabilized waste) goes to landfill
- This is consistent with their objectives

- Consistent with literature
- Consistent with others' experience
- Consistent with our experience

Otter Lake Landfill

- Constructed with a composite liner system
- Leachate collection and treatment
- Landfill gas collection installed after 3½ years

Otter Lake Costs

	1998 Capital
Mechanical	$24 M
Biological	$ 11 M
Landfill	$15 M + $12 M for each additional cell
Land/Roads	$4 M

	02/03 Annual Operating	02/03 Annual OP + Debt
Mechanical	$8.4 M (≅ $150/t)	$9.9 M (≅ $180/t)
Biological	$1.8 M (≅ $30/t)	$ 3.5 M (≅ $60/t)
Landfill	$2.7 M (≅ $55/t)	$ 7.3 M (≅ $150/t)

*Per tonne costs estimated using tonnages from 2000 GAP

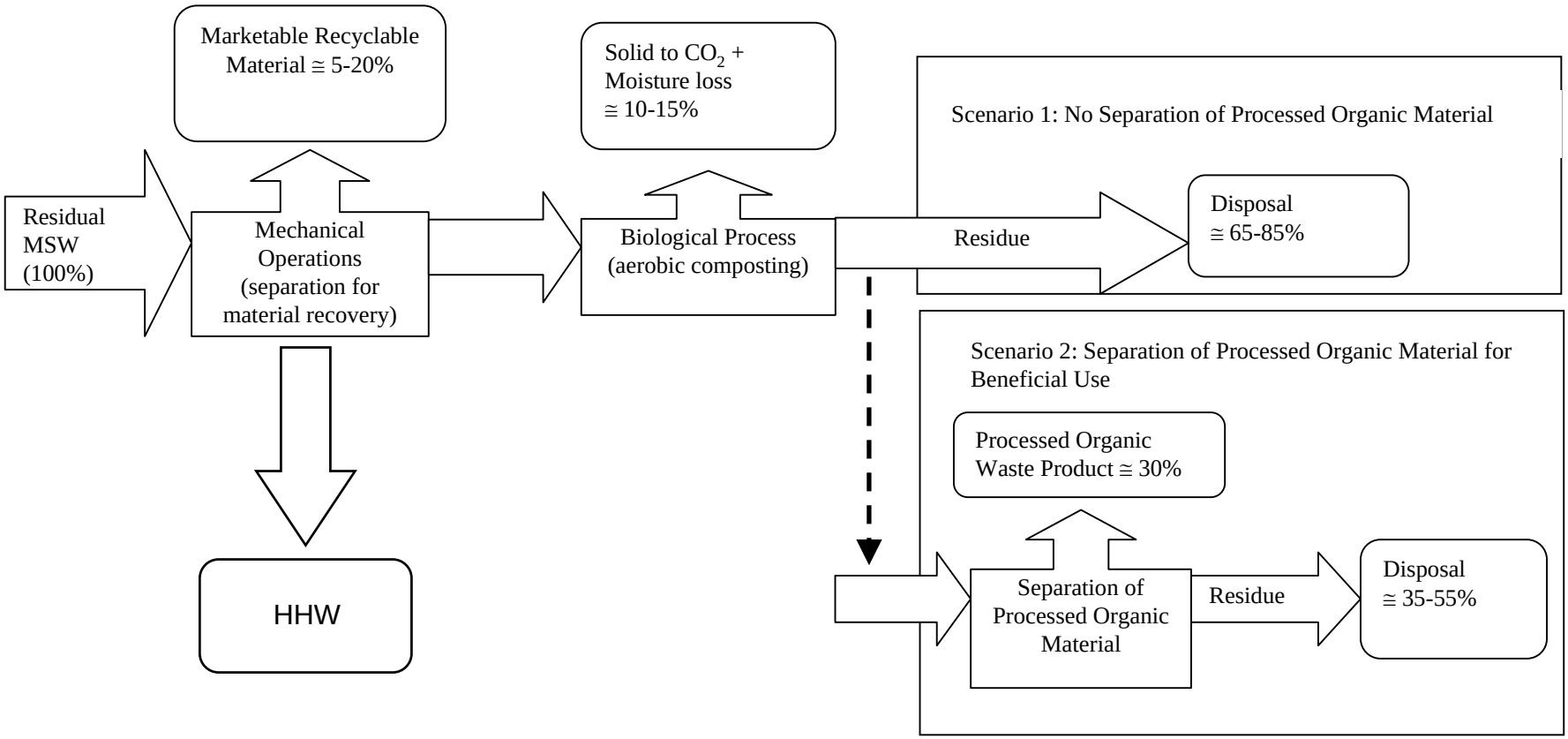
*Mechanical and Biological per tonne costs based on 54,782 t

*Landfill per tonne cost based on 48,321 t

Other Examples of MBT/BMT for MSW or RMSW Processing

- Conporec (Quebec)
- Edmonton
- USA
- Europe

Conceptual Application of MBT for Toronto Residual MSW



*Based on RMSW composition in RFQL for SSRF

Applicability for Toronto

Depends on Toronto's objectives for MBT

- Diversion
  - Recovery
  - New Products (compost, biogas, etc.)
  - Solids and moisture loss
- Environmental impact of disposal
- Meet new reg. requirements
- Other

Depends on whether or not MBT can meet those objectives

- What diversion rate can we realistically expect?
- Can we produce a safe, marketable organic product?
- What downstream benefits can we realistically expect?

Depends on overall environmental performance relative to status quo and other options

Depends on the cost

Approvals

- Toronto is doing an EA for RMSW management
    - MBT will be considered as an option
    - MBT ***may*** be identified as a preferred option by EA
- If MBT is considered outside of the EA for RMSW, then an EA would be required if:
    - Facility has 200 tonnes or more of residue per day; or
    - The Minister receives, and approves, a request for bump up
- EPA approvals will be required for MBT facility
- Other approvals may be required for facility
- EPA approvals may be required for specific sites at which the organic product could be beneficially utilized (e.g., land application, remediation, etc.)

Questions

Q1: **What are the quantity and quality of leachate at the Otter Lake Landfill?**

A1: Toronto staff do not have data on leachate production at Otter Lake. In general the quantity of leachate will depend on the moisture content of the waste and the amount of precipitation that enters the landfill. The leachate quality will depend on the types and amounts of organic and inorganic compounds in the waste. Since the organic material at Otter Lake is only partially stabilized, the leachate will include organic compounds.

Q2: **What is the quantity of landfill gas at Otter Lake Landfill compared to regular landfills and did, or could, the partial stabilization of the waste make LFG utilization nonfeasible?**

A2: Toronto staff do not have data on LFG production at Otter Lake. Since the organic material is only partially stabilized, there will still be LFG production. At Otter Lake, a LFG collection system was installed after 3½ years of operation. In general partial stabilization should reduce the total amount of methane production. The LFG production is dependant on the type and amount of organic material that was in the waste, the degree of stabilization, and the amount of moisture in the waste available for microbial action.

Questions

Q3: **Can the organic product from MBT processing of municipal solid waste or residual municipal solid waste be marketed as a product in Ontario?**

A3: There are three broad markets in Ontario - bagged and bulk compost markets and organic waste conditioning sites which require specific approval to use organic waste, (including remediation and alternate daily cover). Each market will have criteria for metals and aesthetic parameters such as glass and plastic. Under the current provincial guidelines, it would be impossible to market the organic product from MBT processing of MSW as compost due to the limits on metals. If the province adopts the CCME metal numbers, it may be possible, but efforts would be needed to improve the aesthetic parameters. Site specific markets could be developed but the ultimate extent of these markets is unknown.

Q4: **If the City was not doing an EA for residual waste management, would an EA be needed for an MBT facility.**

A4: The Province (Environmental Assessment and Approvals Branch of the MOE) has indicated that if the daily residue from the MBT facility (including any stabilized organic material destined for landfill) is 200 tonnes or more, an individual EA would be required. The Minister of the Environment may also approve bump-up requests for facilities with less than 200 tonnes per day of residue.