



Wastewater Solids Management - Atlantic Canada Perspective

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Solving Today's
problems with
Tomorrow
in mind

Wastewater Treatment in Atlantic Canada

Dramatic improvement in this Region over the Past 10
to 15 years.



St. John, NB



Dartmouth, NS



Charlottetown, PEI

Halifax
Herring Cove
New Glasgow

Wastewater Treatment in Atlantic Canada

Dramatic improvement in this Region over the Past 10
to 15 years.



Summerside, PEI



Moncton, NB



St John's, NFLD

Quispamsis
Miramichi
Fredericton

Wastewater Treatment in Atlantic Canada - progress

◆ Nova Scotia

- Sydney: from raw discharge → enhanced primary
- Halifax: 3 WWTFs Halifax, Dartmouth and Herring Cove
from raw discharge → enhanced primary treatment.

◆ New Brunswick:

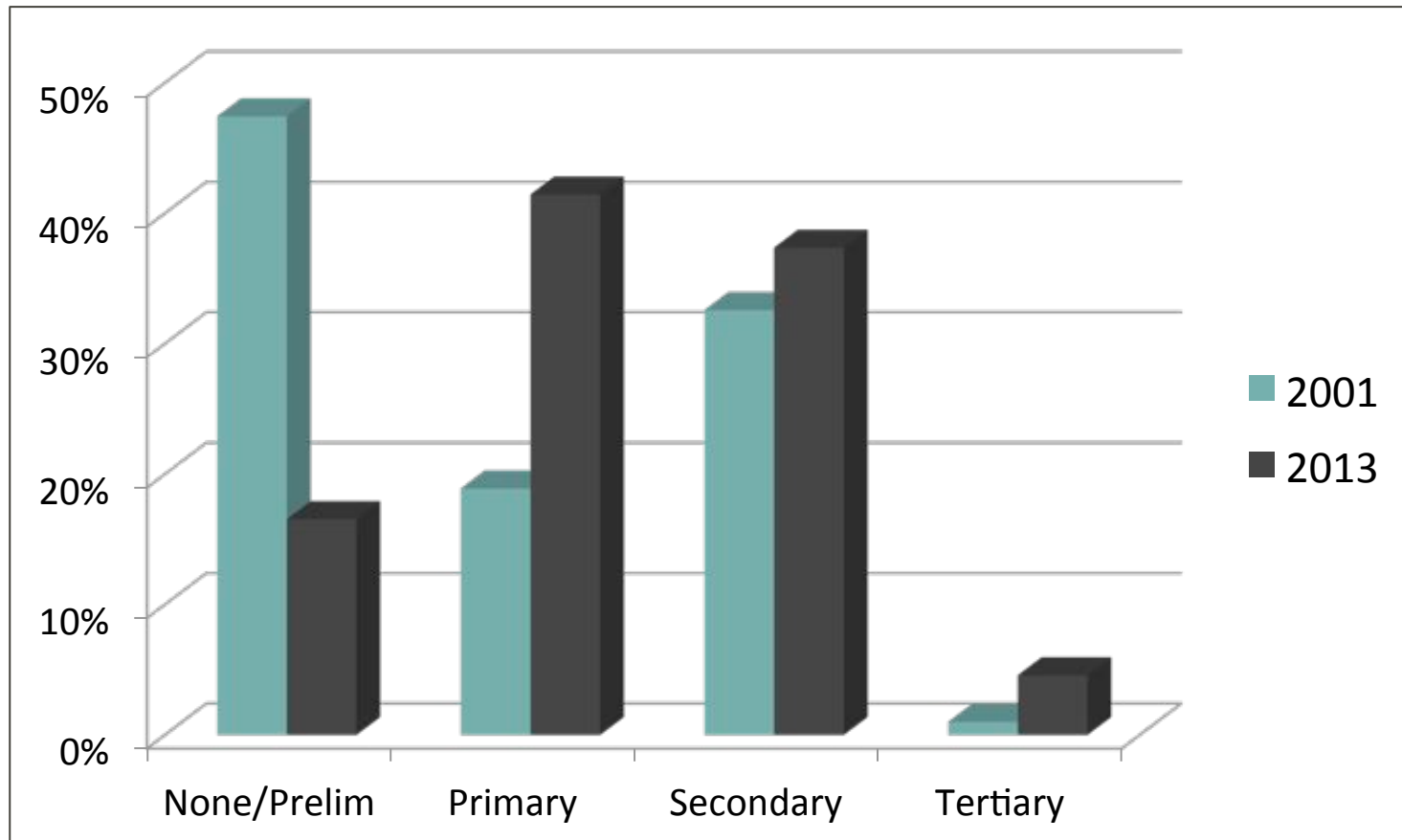
- Moncton: from raw sewage discharge → enhanced primary
- Saint John: from raw discharge → secondary treatment

Wastewater Treatment in Atlantic Canada - progress

- ◆ Newfoundland
 - St. John's: from raw sewage discharge → to enhanced primary.

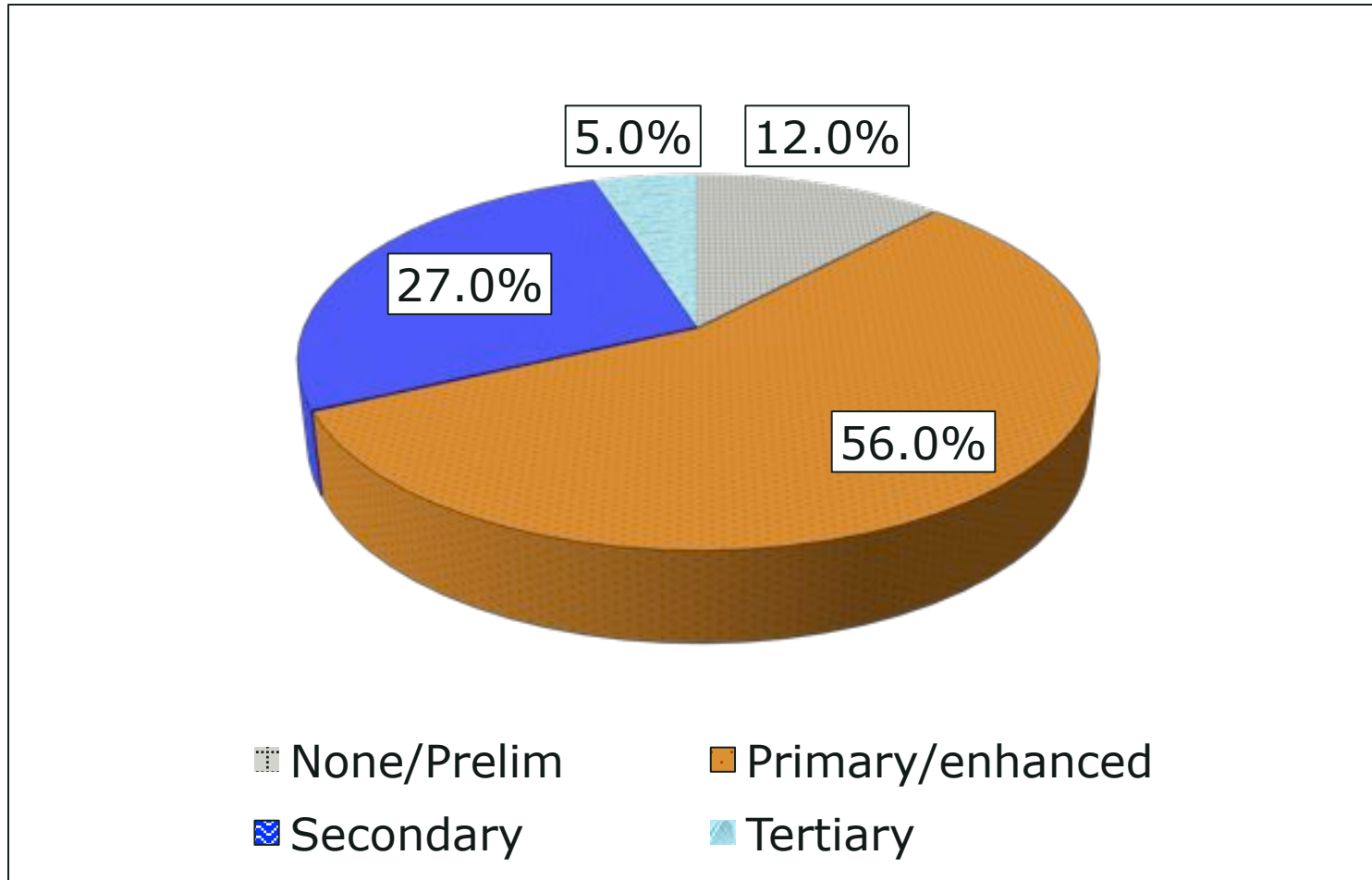
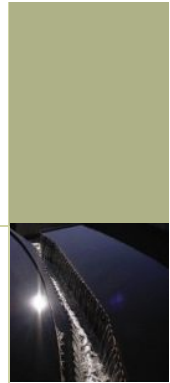
- ◆ Prince Edward Island
 - Charlottetown: from primary treatment → secondary treatment
 - Summerside: from primary treatment → advanced tertiary treatment.

Wastewater Treatment in Atlantic Canada - progress



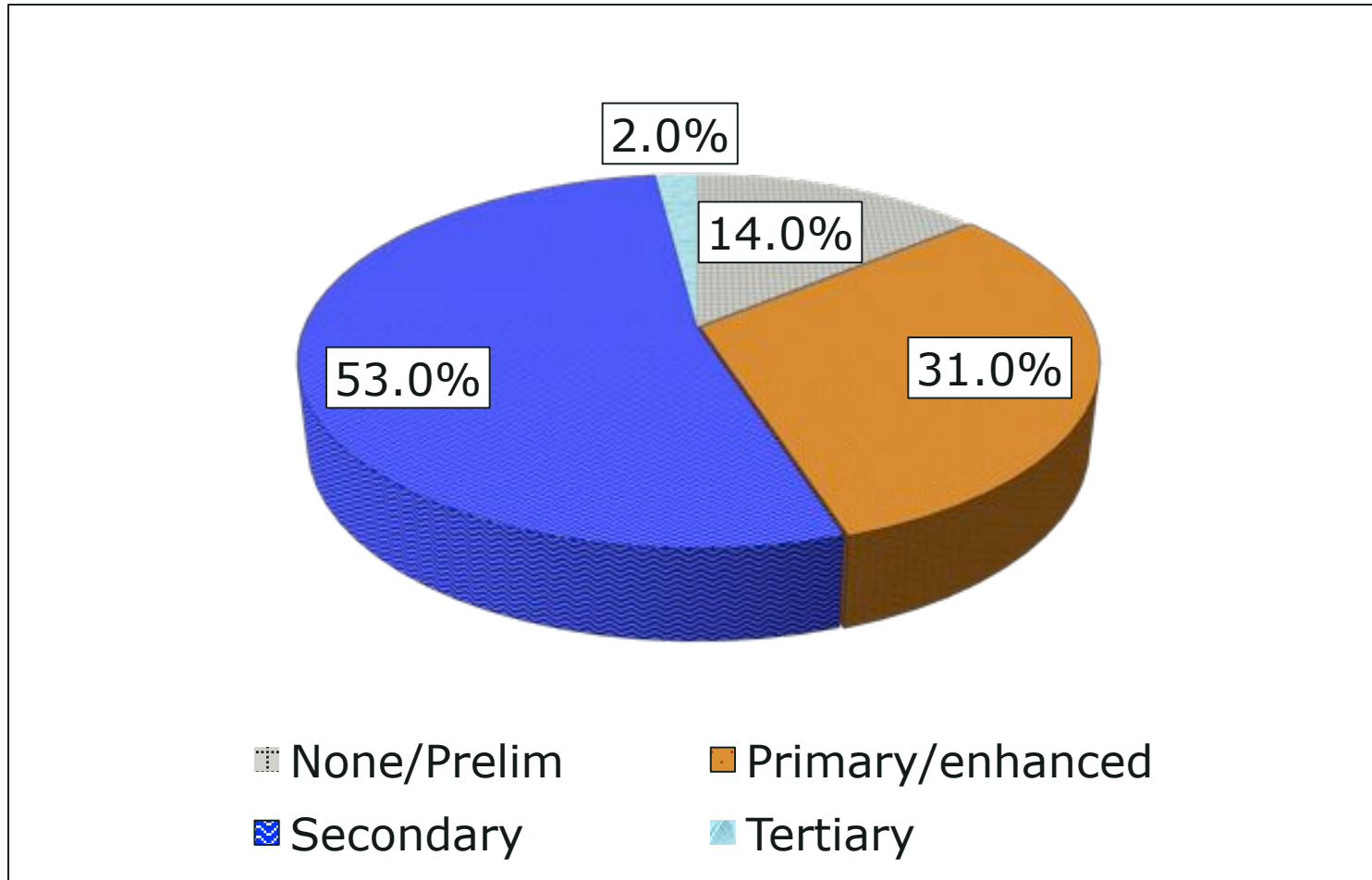
Progress in the last 10 to 15 years

Sewage Treatment in Nova Scotia



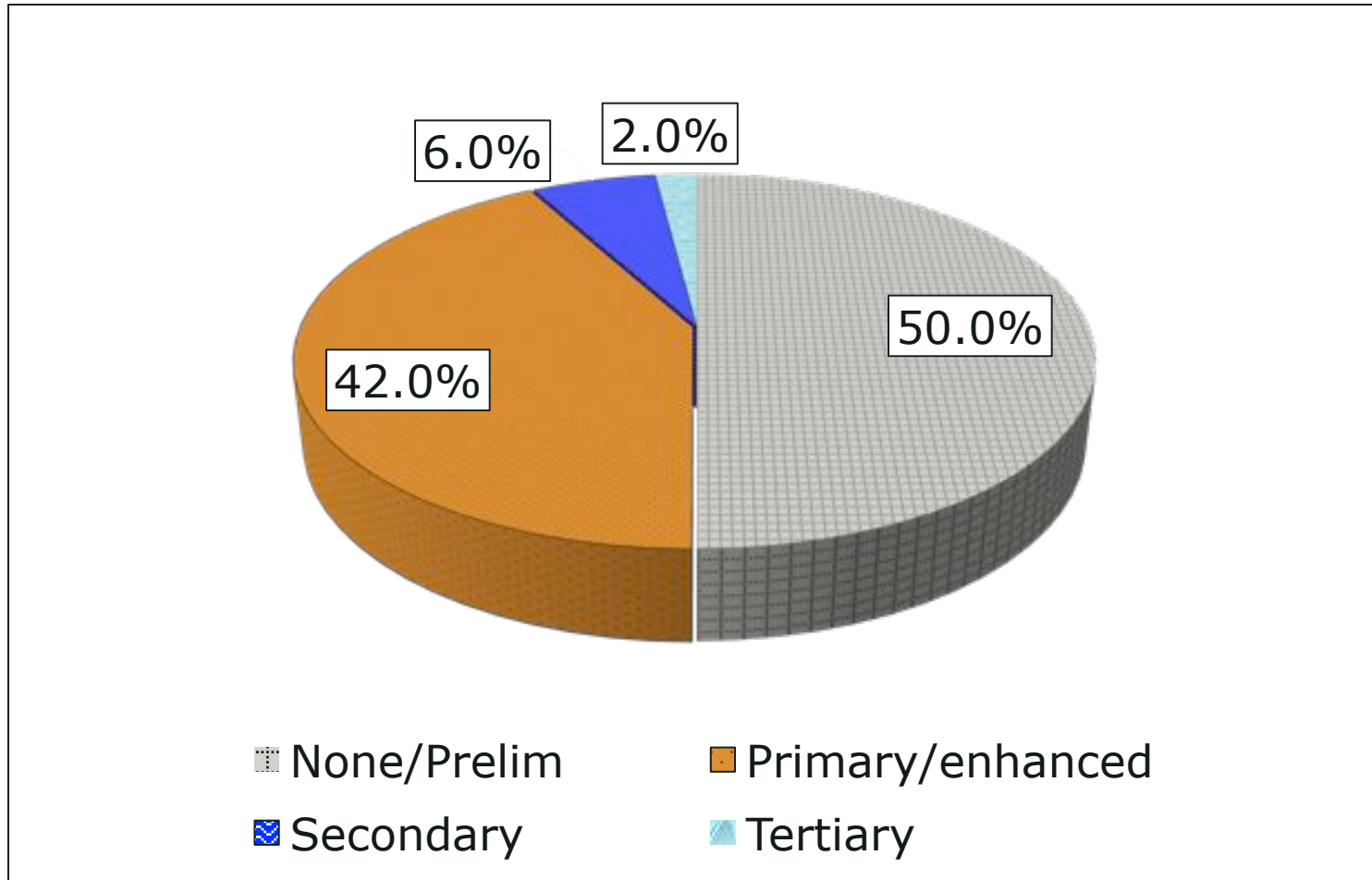
Source: 2011 Municipal Water Use Report by Environment Canada

Sewage Treatment in New Brunswick



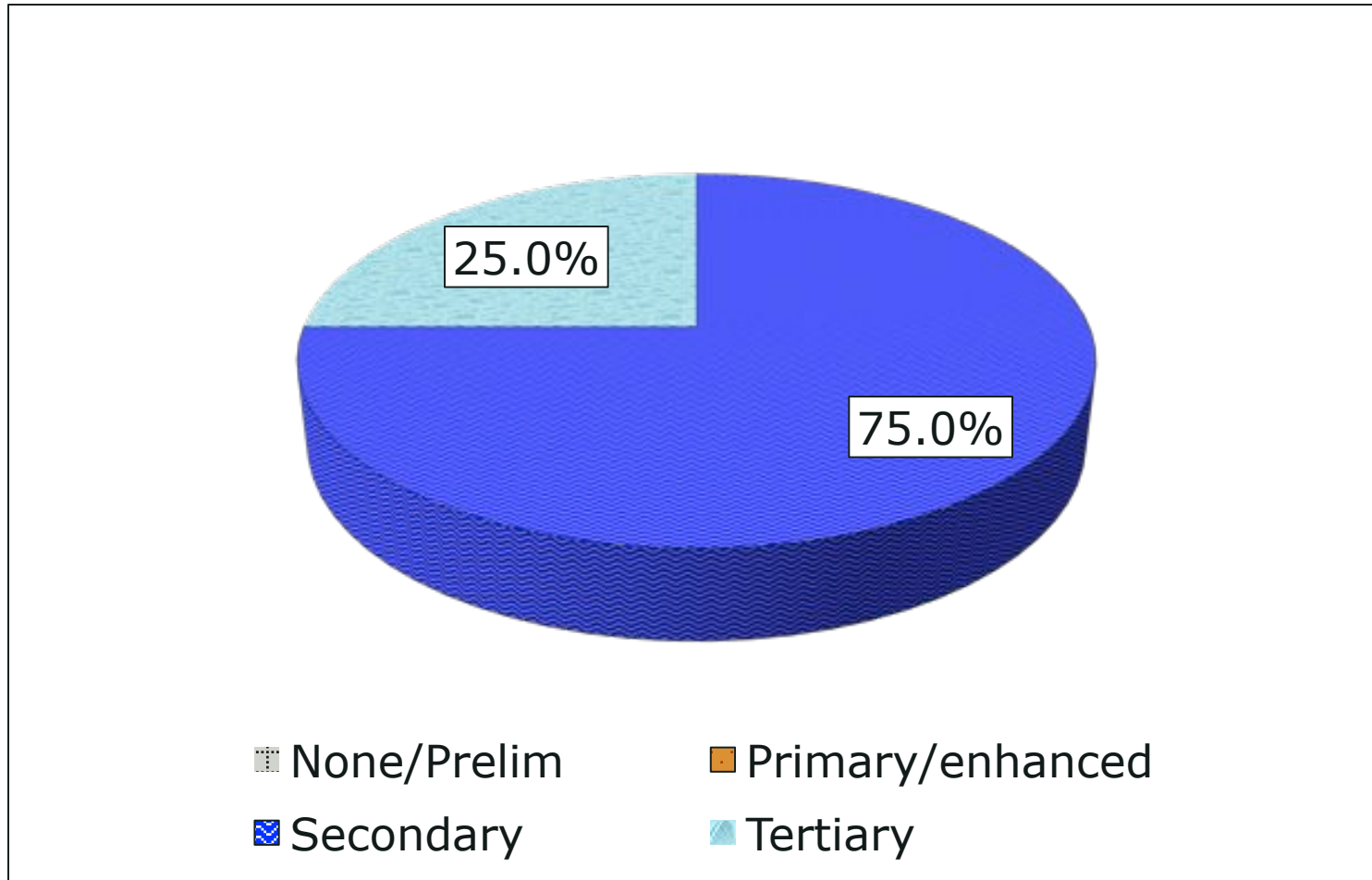
Source: 2011 Municipal Water Use Report by Environment Canada

Sewage Treatment in Newfoundland

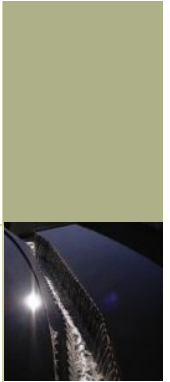


Source: 2011 Municipal Water Use Report by Environment Canada

Sewage Treatment in Prince Edward Island



Source: 2011 Municipal Water Use Report by Environment Canada



- ◆ But....
- ◆ Treatment of wastewater produces solids also known as sludge.
- ◆ Treated sludge is referred to as “Biosolids” using industry lingo.

Solids Production by province

Sludge & biosolids production by province

	Sludge / Biosolids Estimated w.t./yr*
Nova Scotia	55,000
New Brunswick	24,000
Newfoundland	9,000
PEI	8,000
Total	96,000 w.t./year

*Does not include lagoon sludges. Quantity would more than double with lagoons.

Solids Production Atlantic Canada

Macro Approach (includes lagoons)

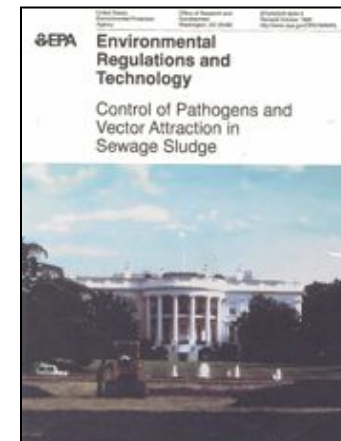
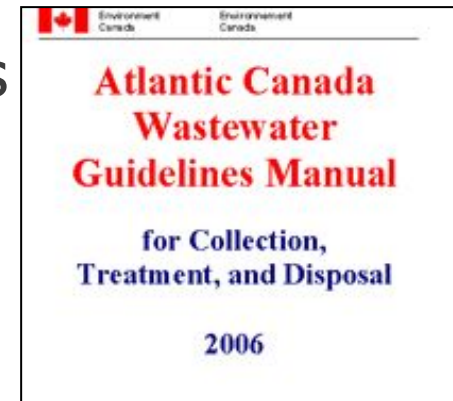
- 2.4M population Atl Can; of which 1.8M is sewered
- $1.8\text{M} \times 0.1\text{kg DS/day} = 180 \text{ kg DS/day}$
- $180 \text{ kg DS/day} \times 365 \text{ day/year} = 66,000\text{t DS/year}$
- $66,000\text{t DS/year} \div 25\% \text{ cake solids}$
- $= 265,000 \text{ WT/year}$

Biosolids Treatment requirements

Atlantic Canada Guidelines - biosolids from USEPA Guidelines created in 1993. (Part 40 CFR 503)

Three sludge treatment requirements include:

1. Pathogen Reduction
2. Vector Attraction Reduction
3. Trace Metals



Atlantic Canada Guidelines pathogen reduction requirements

Class A & EQ
(FCM Categories 1 & 2, USEPA Class A etc.)

FC < 1,000 MPN/g d.s.
OR
Salmonella < 3 MPN/ 4 g d.s.

Class B
(FCM Category 3, USEPA
Class B etc.)

FC < 2,000,000 MPN/g d.s.

Vector Attraction Reduction

aka stabilization

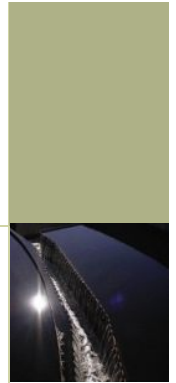
- ◆ Reduce volatile solids by at least 38% during treatment.

OR

- ◆ Specific oxygen uptake rate (SOUR) < 1.5 mg O₂/hr/g dry sludge (only applicable to aerobic processes)

OR

- ◆ Addition of sufficient alkaline material (lime) to produce mixture with minimum pH of 12 after 2 hours of vigorous mixing



Trace Metal Requirements

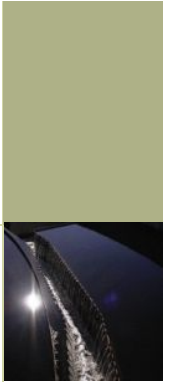
METAL (mg/kg)	Atl Can Guide Class A/B	Atl Can Guide EQ	NS Guidelines A/B
Arsenic	75	41	13/75
Cadmium	85	39	3/20
Chromium	-	1200	210/1060
Cobalt			34/150
Copper	4300	1500	400/760
Mercury	57	17	0.8/5
Molybdenum	75	-	5/20
Nickel	420	420	62/180
Lead	840	300	150/500
Selenium	100	100	2/14
Zinc	7500	2800	700/1850



Solids Handling major centres in NS

- ◆ Halifax, NS - Aerotech
 - 40,000 w.t./year alkaline stabilization & pasteurization.
 - Beneficial reuse land application.
- ◆ Sydney, NS
 - 2200 w.t./year primary sludge cake.
 - Composted by in-vessel composting system.

Solids Handling major centres in NS

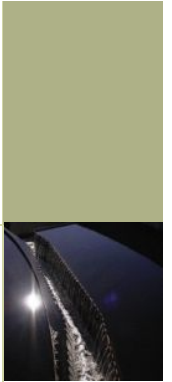


- ◆ Truro, NS
 - 4500 w.t./year aerobically digested sludge cake.
 - Sent to a commercial composter end product is used for beneficial reuse.
- ◆ New Glasgow, NS
 - 3900 w.t./year aerobically digested sludge, alkaline stabilization & pasteurization
 - Beneficial reuse land application

Solids Handling major centres in NB

- ◆ Fredericton & Saint John
 - 14,000 w.t./yr of dewatered sludge cake at design.
 - Sludge is then transported to commercial composting facility
- ◆ Moncton
 - 11,000 w.t./yr of dewatered sludge
 - Sludge is composted by GMSC and sold as a soil amendment.

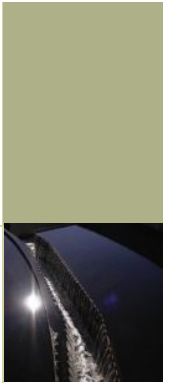
Solids Handling major centres in PEI



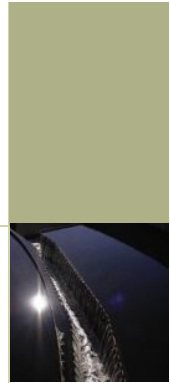
- ◆ Charlottetown
 - 3,000 w.t./yr anaerobically digested, pasteurized
 - Biosolids are dewatered on-site and then land applied as soil amendment
- ◆ Summerside
 - 4000 w.t./yr alkaline stabilization and pasteurization.
 - Biosolids are sold to a commercial lime and fertilizer company.

Solids Handling major centres in NFLD

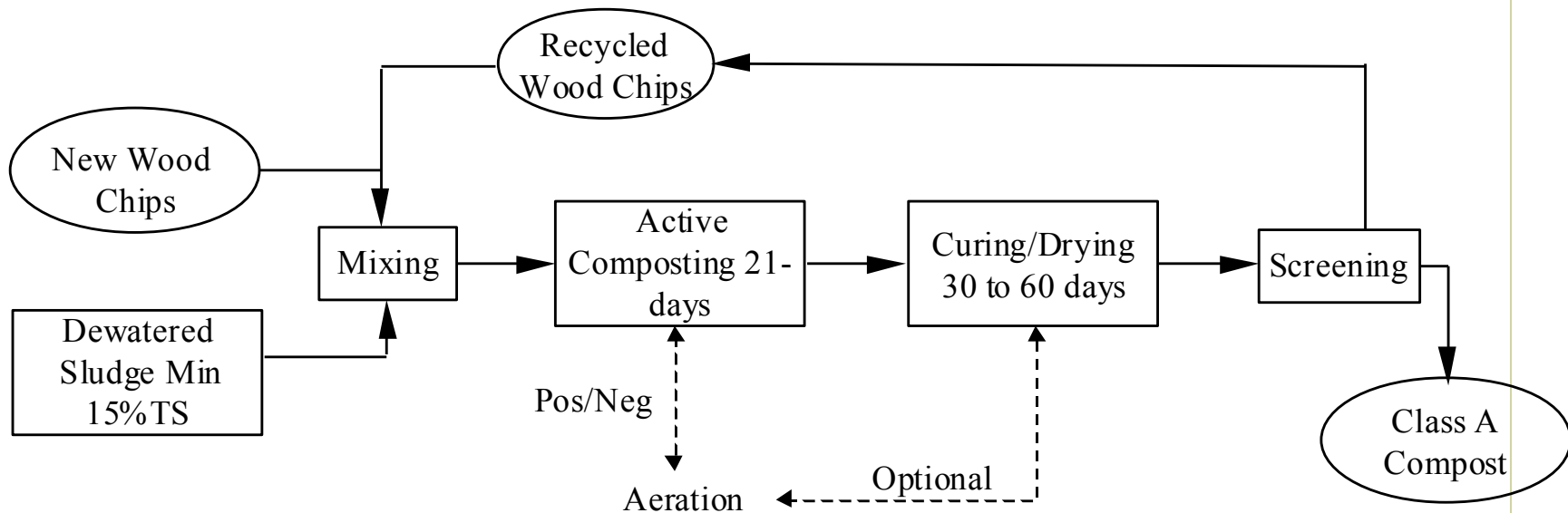
- ◆ St John's
 - 8500 w.t./yr anaerobically digested, primary sludge
 - Biosolids are then disposed of.



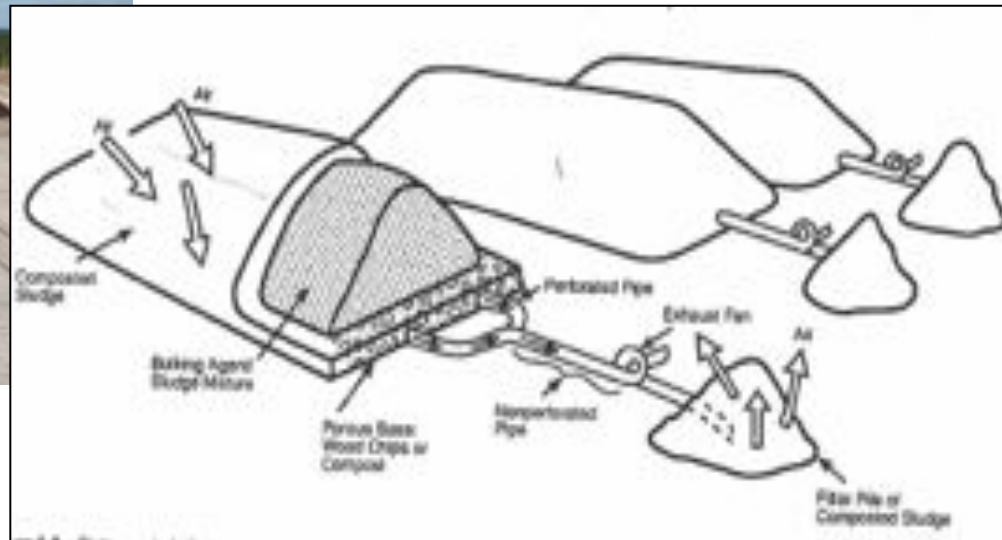
Composting aerated static pile



- ◆ Composting: at least 50% of the regions biosolids
- ◆ Regionally, 235,500 tonnes were composted in Atlantic Canada (includes green cart waste)



Class A Sludge Treatment technologies employed



Compost saleable end product

Compost for sale as “Compost Mulch”
Or “Compost Soil Conditioner”.

Price ranges from \$35/yd to \$20/yd
Depending on product and quantity.



Compost land reclamation

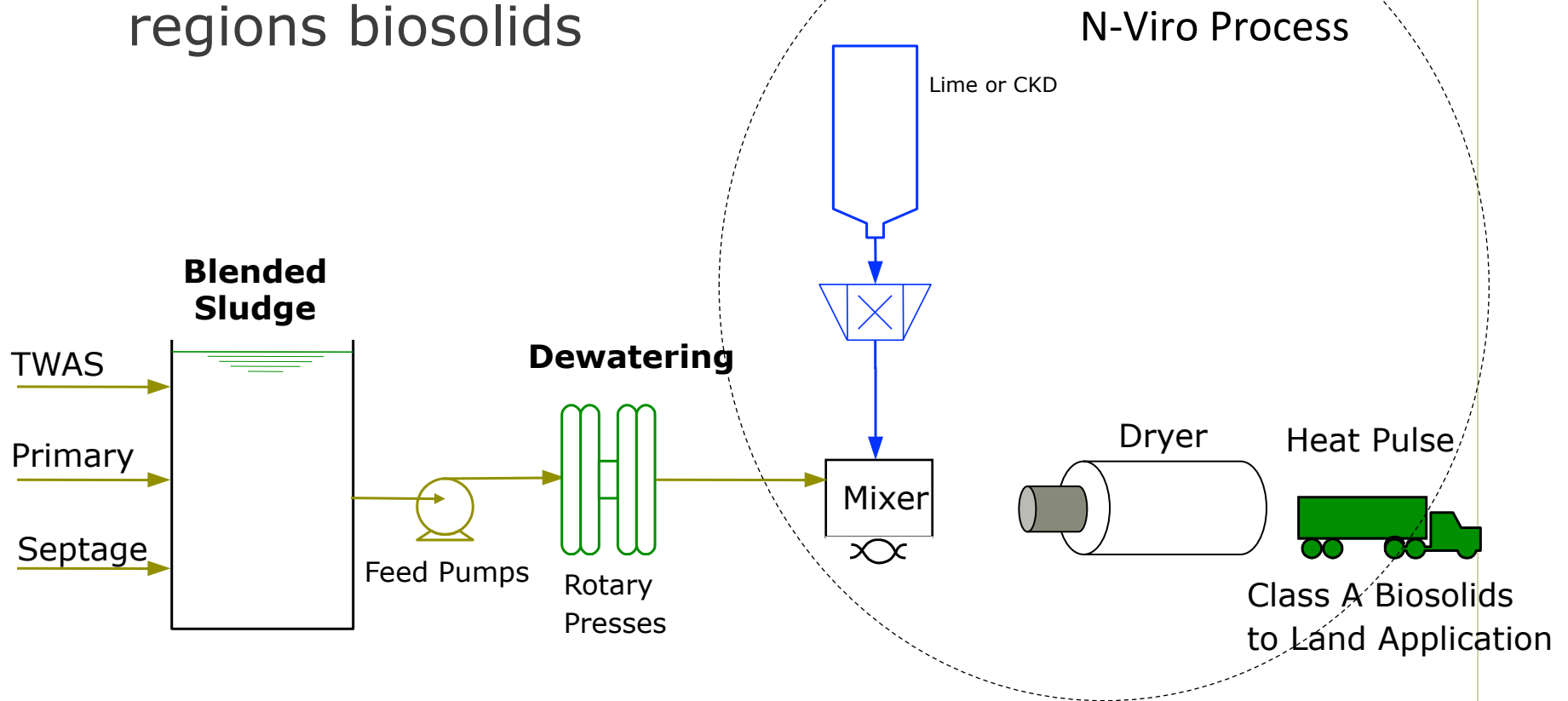


http://www.edmonton.ca/for_residents/ReVive-Reclamation-Compost.pdf

Class A Sludge Treatment technologies employed



- ◆ Alkaline Stabilization / Pasteurization: 40% of the regions biosolids



Alkaline Stabilization / Pasteurization

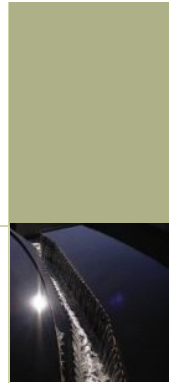


N-Viro end product



- 60% + TS content
- Granular consistency
- Spread with lime spreaders

Biosolids Processing Facility Aerotech Park



Land Application of end product

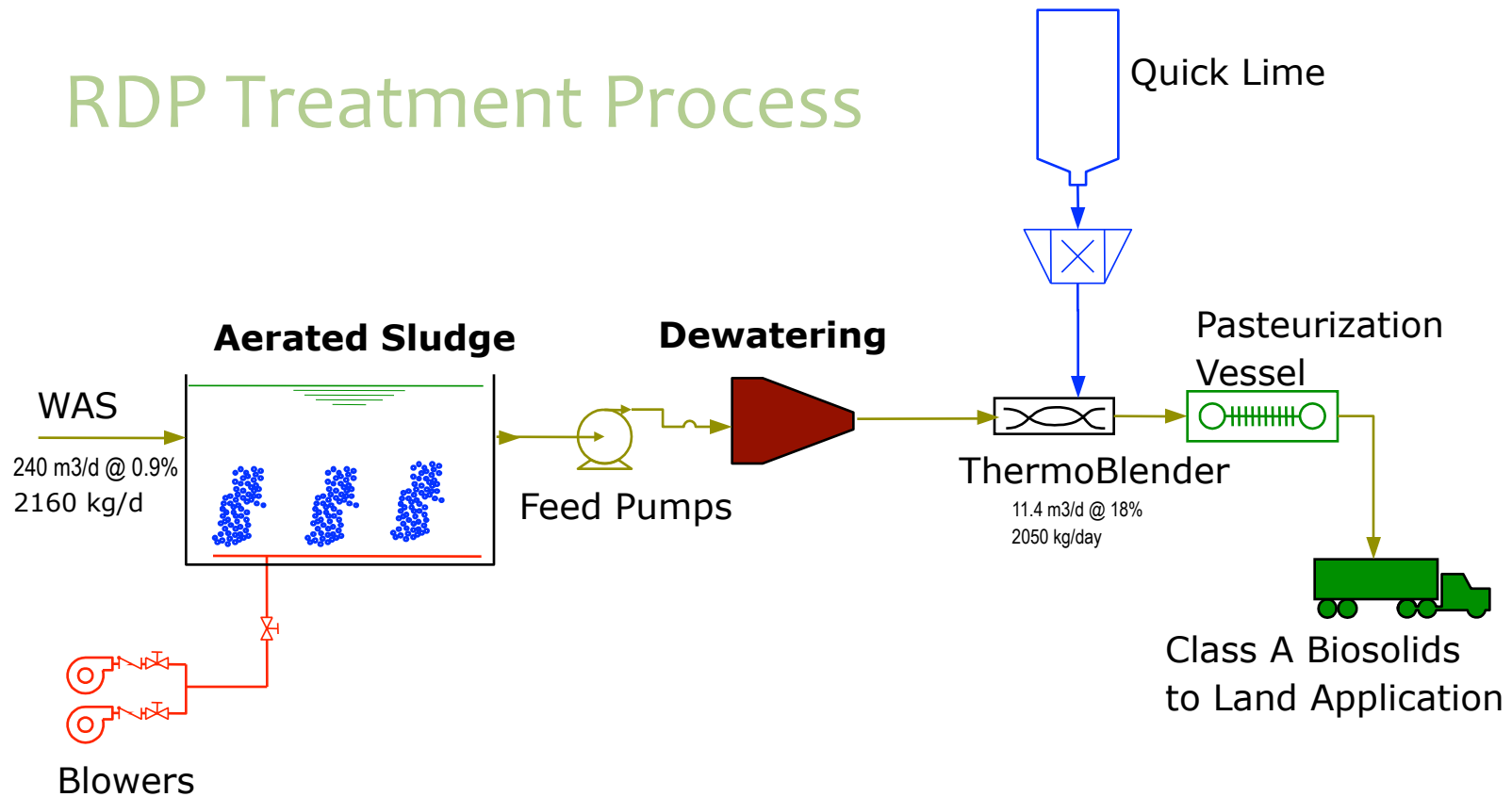


Agricultural lime spreaders



Class A Sludge Treatment technologies employed

RDP Treatment Process



Pasteurization Vessel

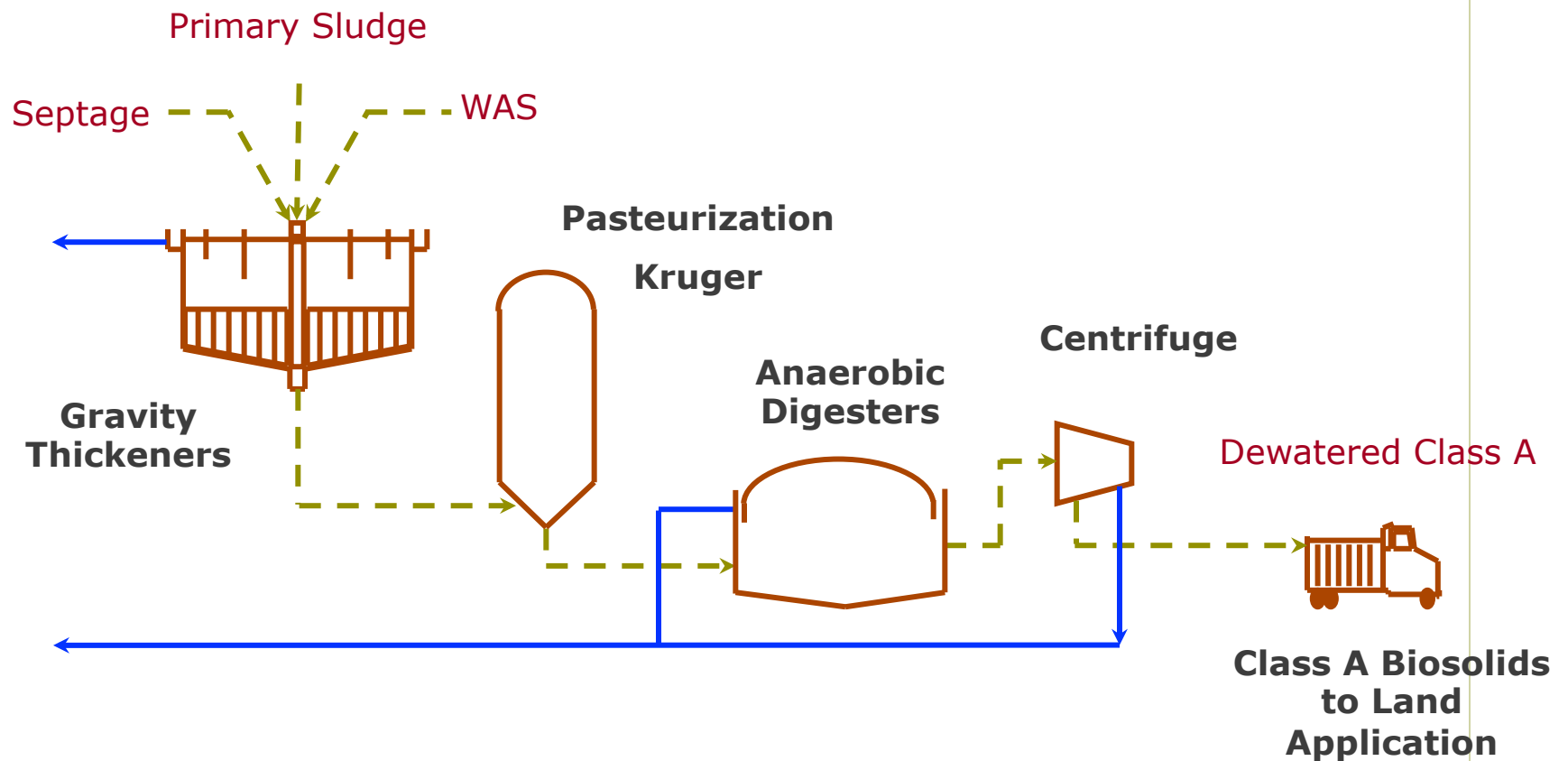


- Temperature of 70 °C for 30 minutes.
- Capacity of 1 tonne/hour.
- 12 kW Heating System



Class A Sludge Treatment technologies employed

◆ Pasteurization and Anaerobic Digestion



Pasteurization and anaerobic digestion



Sludge pre-pasteurization vessels



Anaerobic digesters

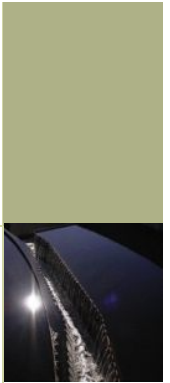
End Product - Characteristics



- 25 to 40 % TS content
- Consistency of wet soil
- Spread with manure spreaders



Land Application of End Product



manure spreaders - cake



Class B Sludge Treatment technologies employed

- ◆ Anaerobic Digestion
- ◆ Aerobic Digestion
- ◆ Lagoon Stabilization

Lagoons like.....



Kentville (New Minas), NS



Saint John, NB

Miramichi,
NB



Quispamsis, NB

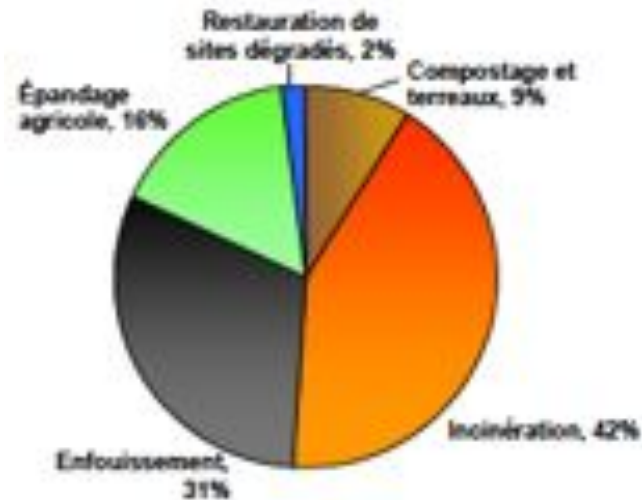
Land application of lagoon sludge?

- Is lagoon sludge stabilized?
- Does lagoon sludge meet pathogen content requirements?
- What about metals?

Québec

In 2007:

- 27% land application
- 42% incineration
- 31% landfill disposal



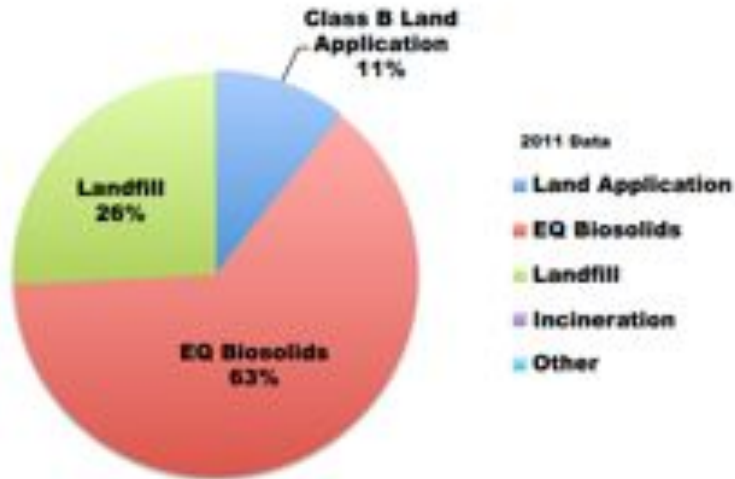
From 2007 report of environment ministry (MDDEP)

In 2011: ~36% used in agriculture, and Quebec City has announced it will shut down incineration and build anaerobic digestion.

New England States

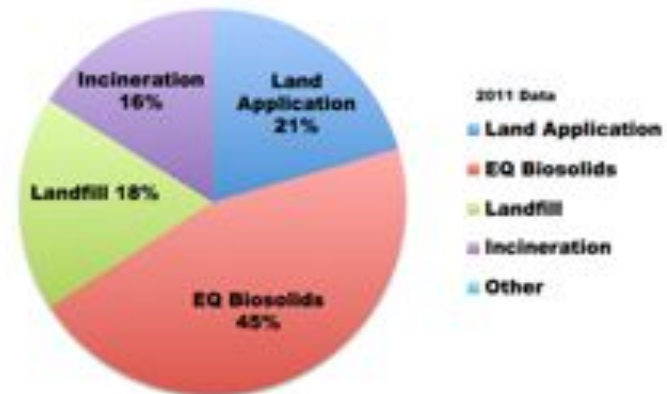


ME Biosolids Use and Disposal
 29,900 Dry US Tons/Year

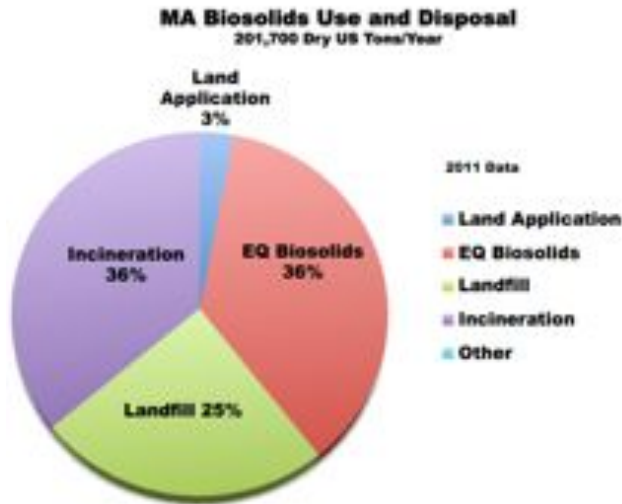


Northern New England – more application to soils

NH Biosolids Use and Disposal
 28,300 Dry US Tons/Year

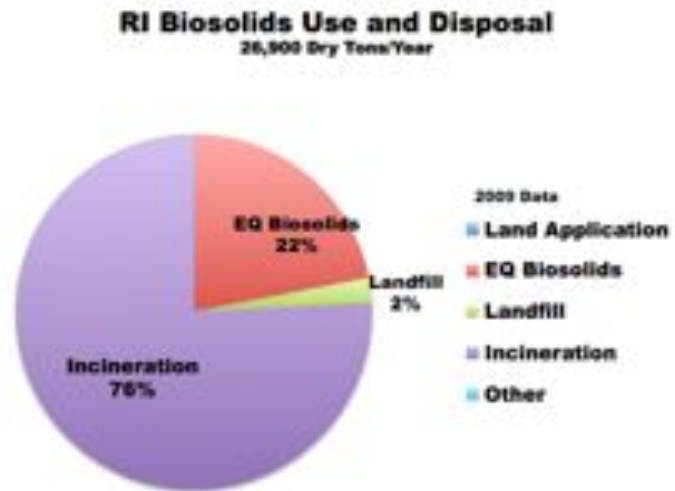


New England States



Mostly Boston

Southern New England – more incineration



Some broader context...

- ◆ Estimates of solids produced in Canada...
 - 388,700 dry tonnes solids produced in 2000
 - ◆ 43% applied to land, 47% incinerated
 - ◆ From CH2MHill Canada. *Biosolids Generation, Treatment, Use and Disposal in Canada. Opportunities for Energy Recovery and Greenhouse Gas Reduction Report*. Prepared for Environment Canada, 2000
 - 860,000 dry tonnes solids produced in 2004
 - ◆ One third each land applied, incinerated, landfilled
 - ◆ Estimate by the CWWA based on flow data 2004 *Municipal Water Use Statistics*, Environment Canada
 - ◆ <http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=2551>

Some broader context...

- In Canada about 860,000 dry tonnes solids produced in 2004
- In the U. S.: 7,180,000 dry tons in 2004
 - ◆ 55% land applied, 15% incinerated, 30% landfilled
 - ◆ From NEBRA, 2007
<http://www.nebiosolids.org/uploads/pdf/NtlBiosolidsReport-20July07.pdf>

End...