East Bay Municipal Utility District

PRODUCING GREEN ENERGY FROM POST-CONSUMER SOLID FOOD WASTES AT A WASTEWATER TREATMENT PLANT USING AN INNOVATIVE NEW PROCESS

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Innovative Energy Management Workshop
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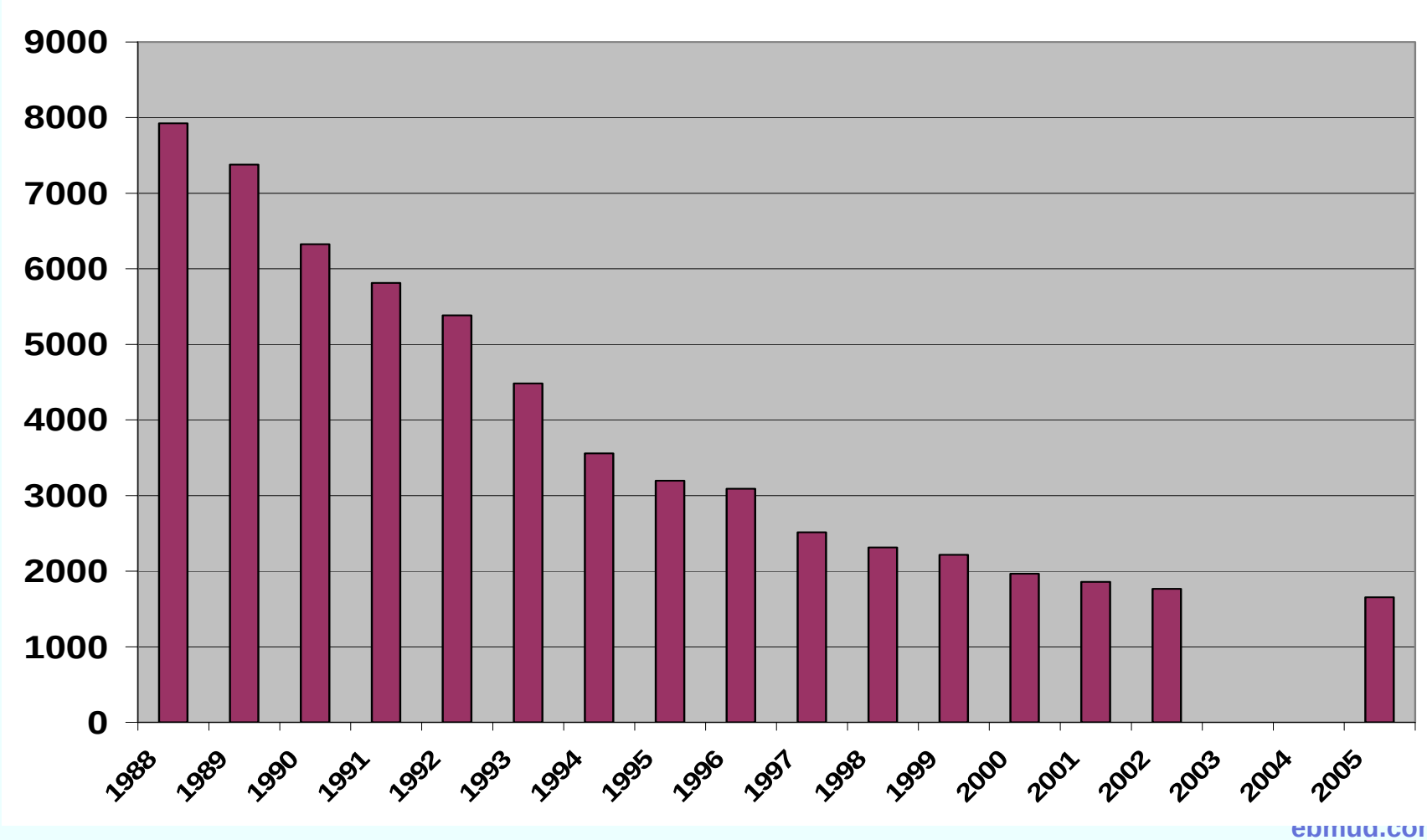
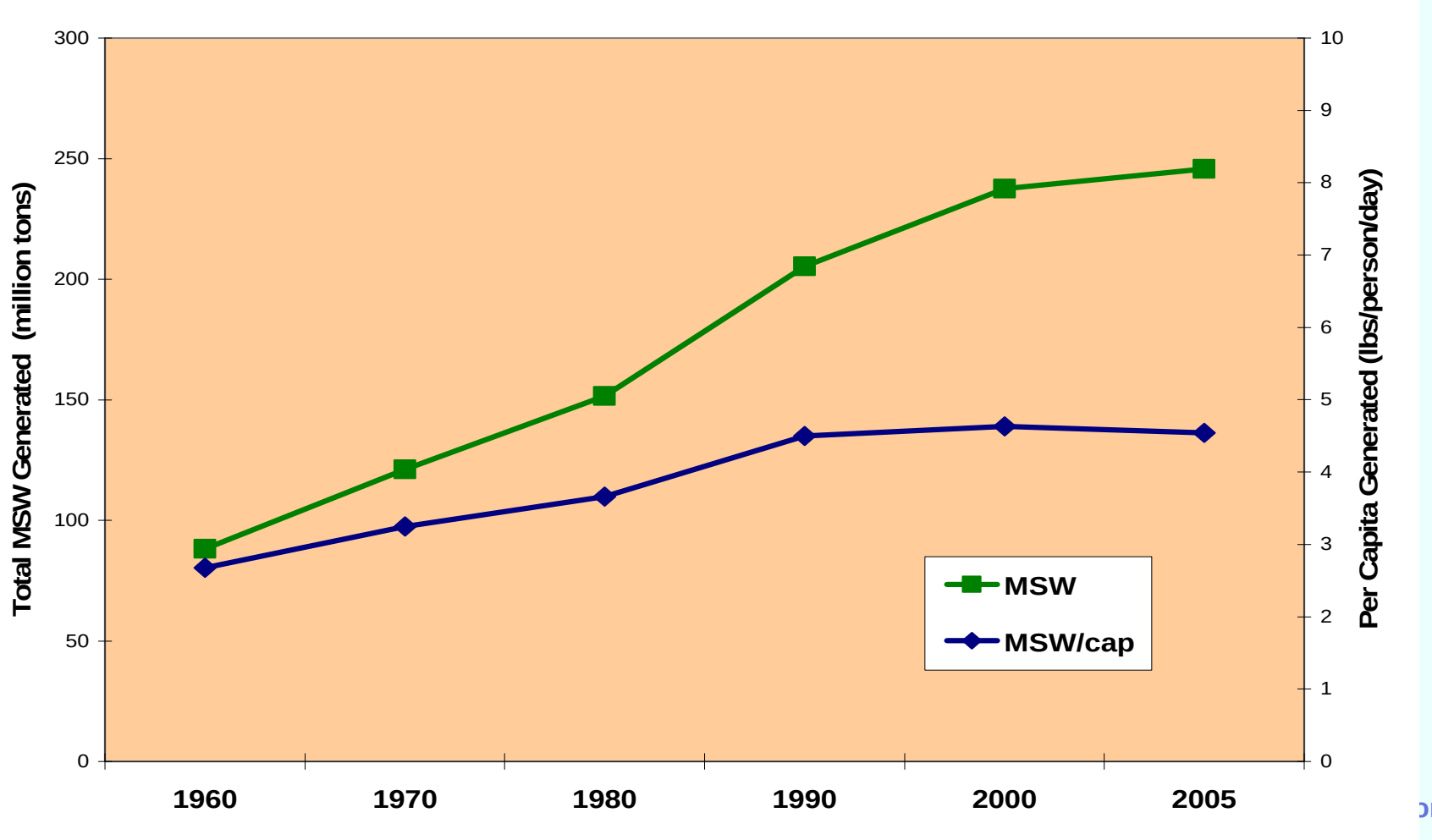
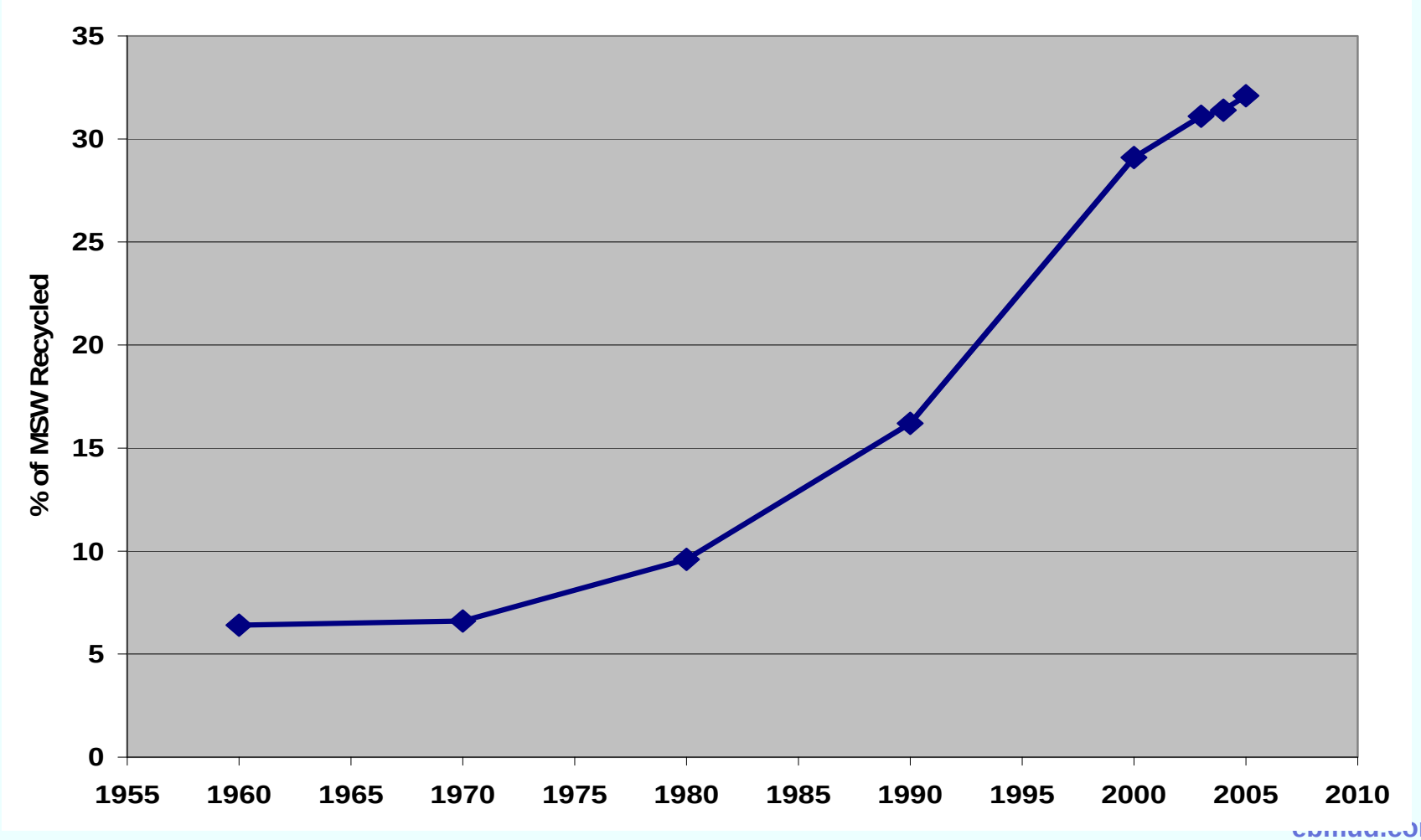
Number of Landfills in the United States 1988-2005



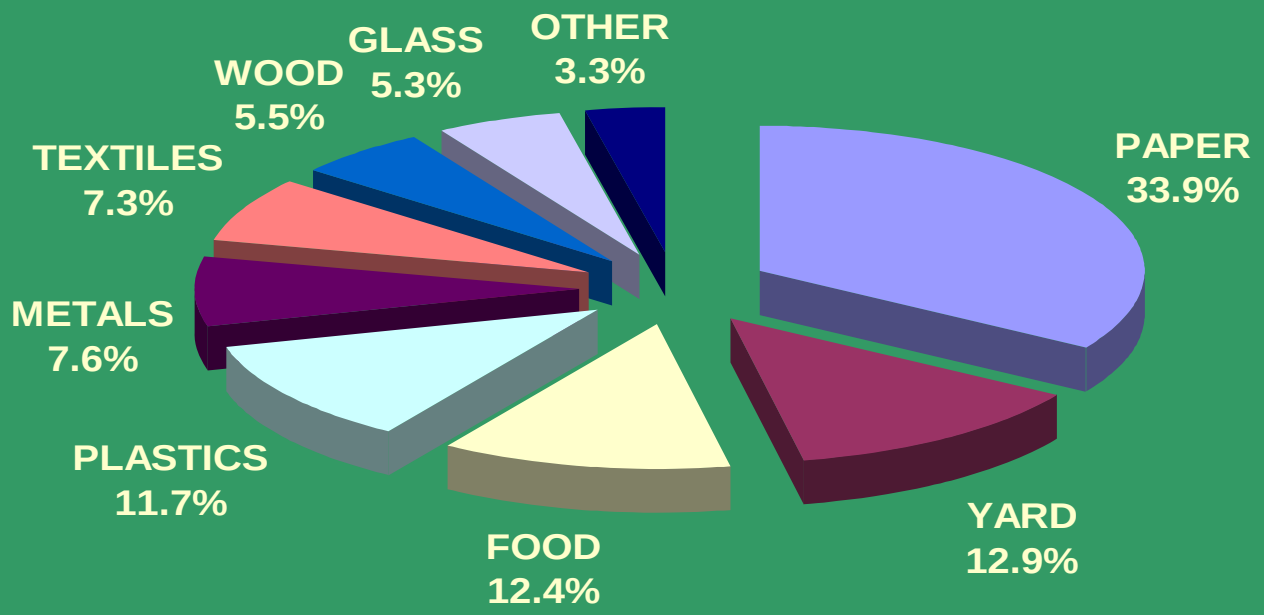
Municipal Solid Waste Generation Rates 1960-2005



Municipal Solid Waste Recycling Rates 1960-2005



Total 2006 MSW Generation Before Recycling



Generation and Recovery of Materials in MSW 2006

Material	Weight Generated (million tons)	Recovery as a Percent of Generation
Paper and Paperboard	85.2	51.6%
Yard Trimmings	32.4	62.0%
Food Scraps	31.1	2.4%

EBMUD's Food Waste Program

- Background
  - Excess digester capacity
  - Energy Crisis—grant funding
- Food waste program development:
  - Contacted local haulers
  - MOA with one hauler 2002
  - Contract with hauler 2003
  - Completed facility and accepted food waste 2004
  - Developed new process and filed patent 2006
  - New production facility in operation and patent issued 2008

Food Waste Challenges

- Contaminants
- Processing technology
- Permitting

EBMUD Facility 2004

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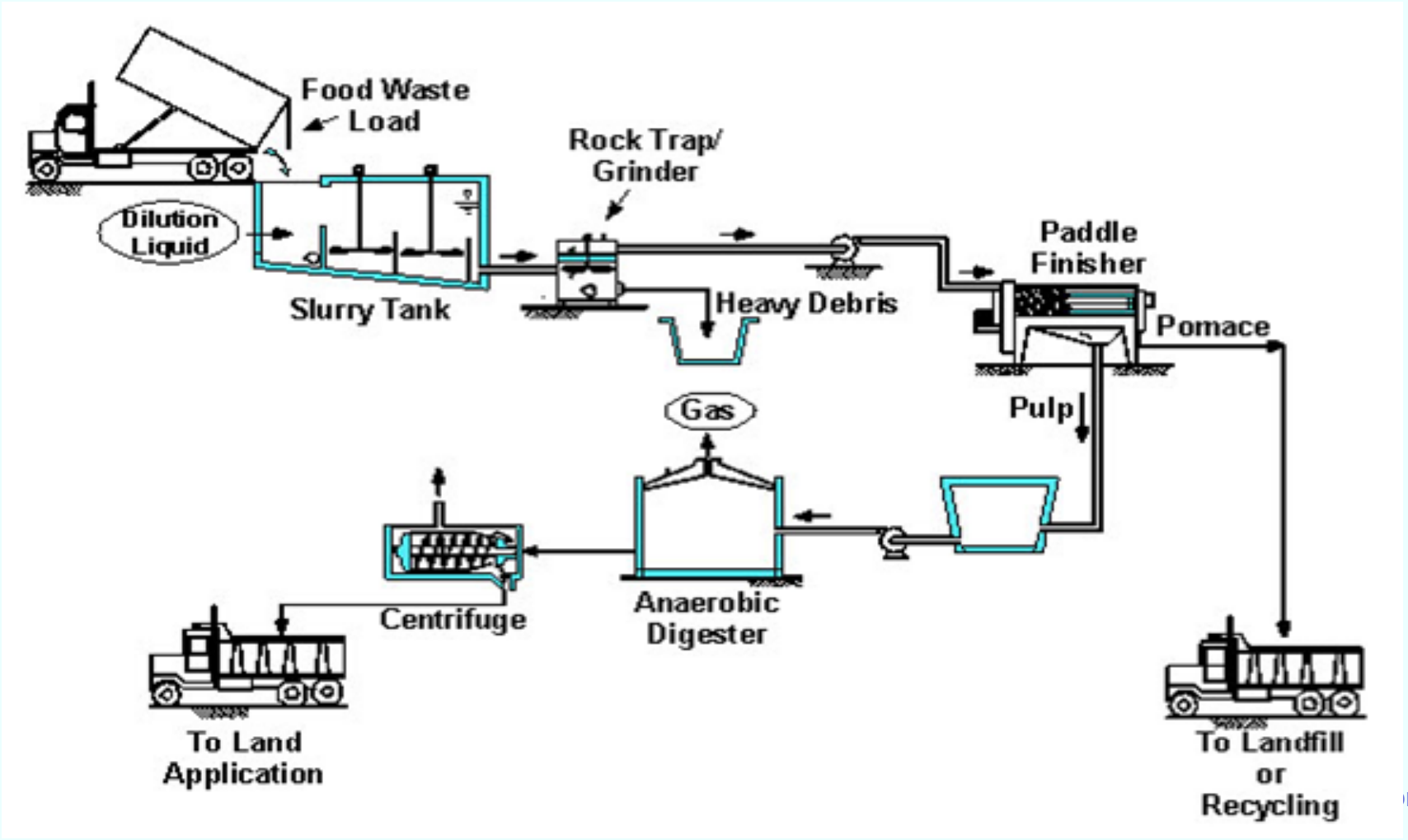
Food Waste Delivery

Delivered Food Waste

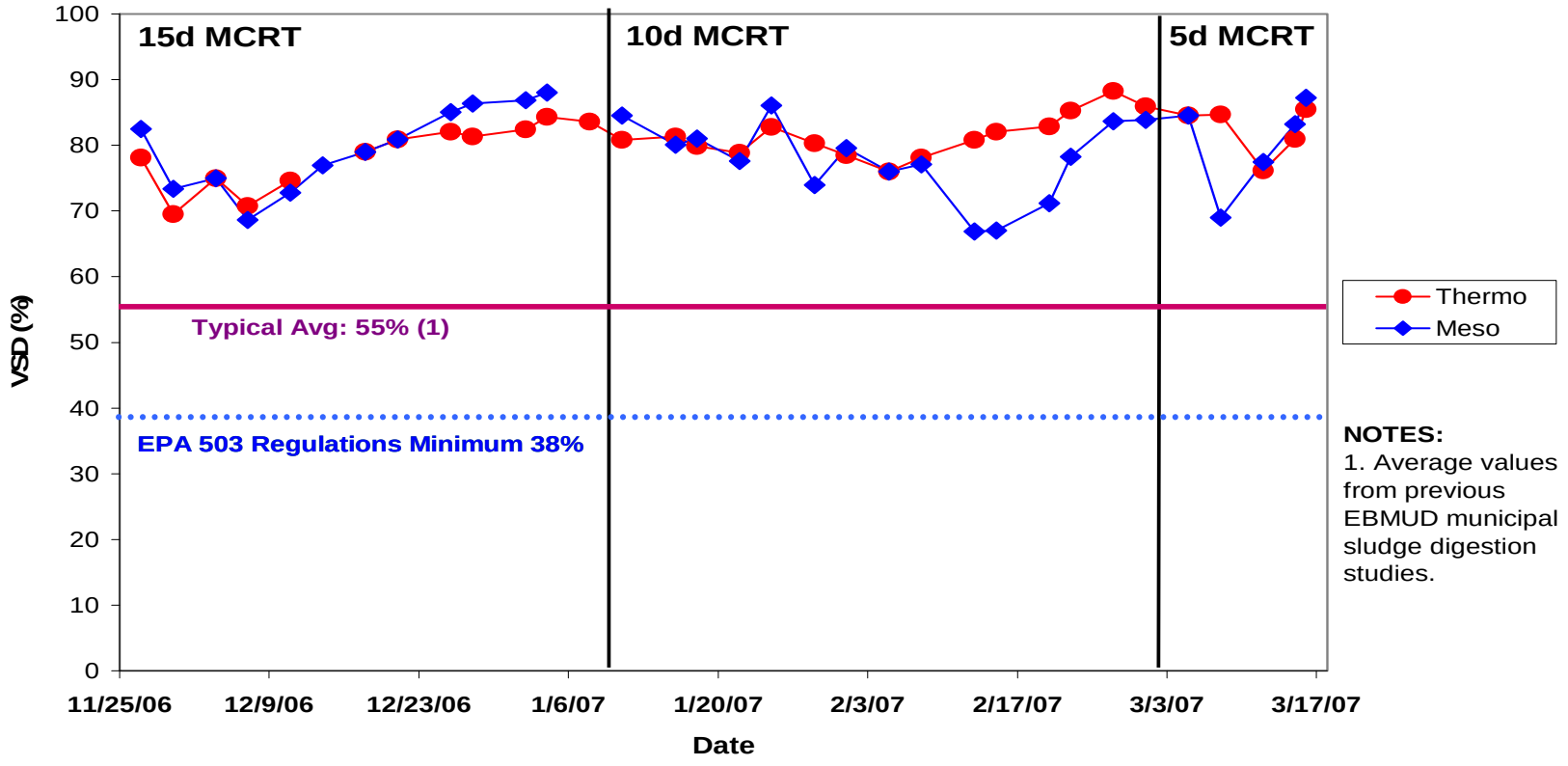
From Food Waste Moyno Pump

EBMUD-patented Food Waste Recycling Process

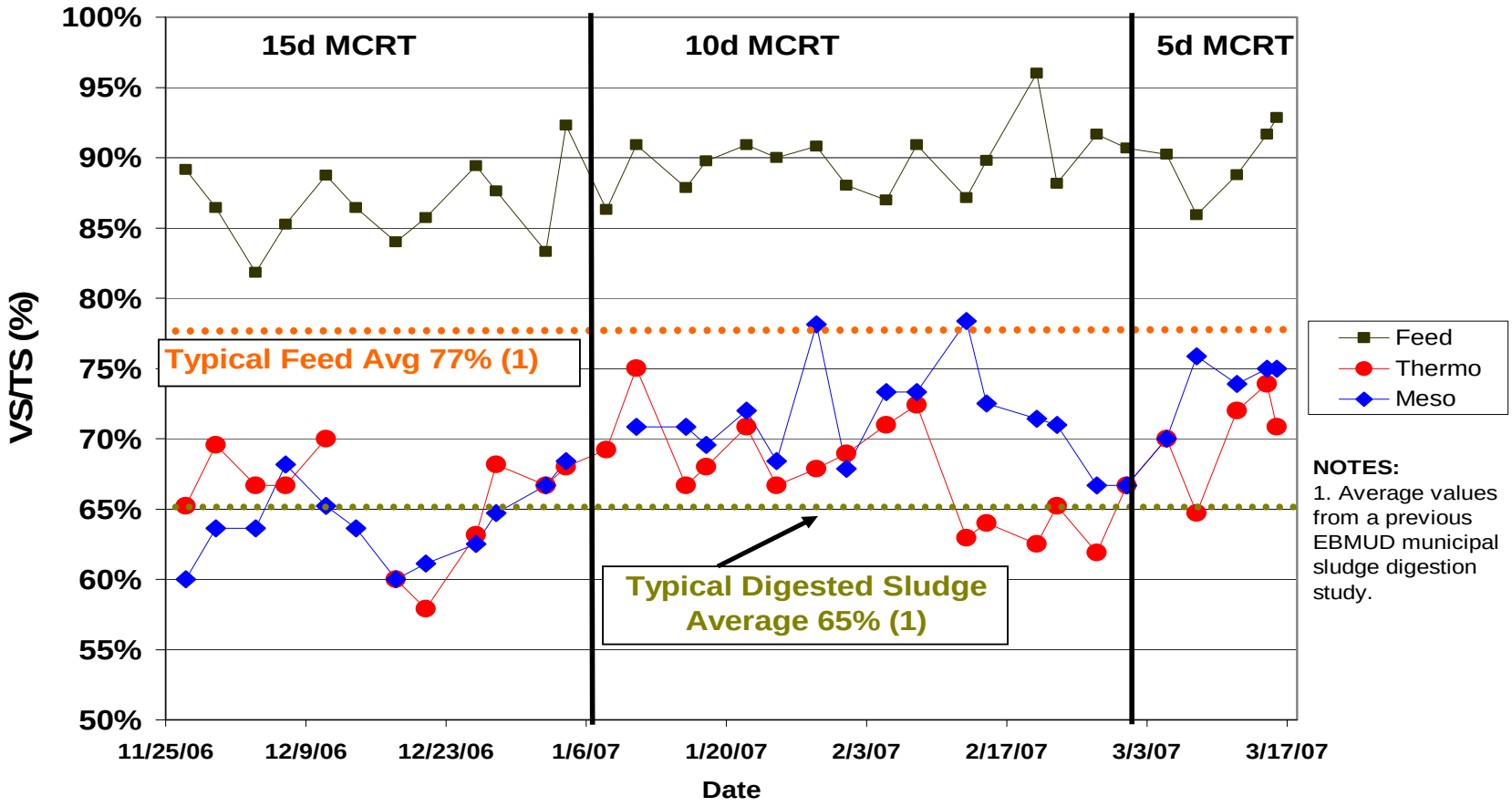


Pulp and Pomace

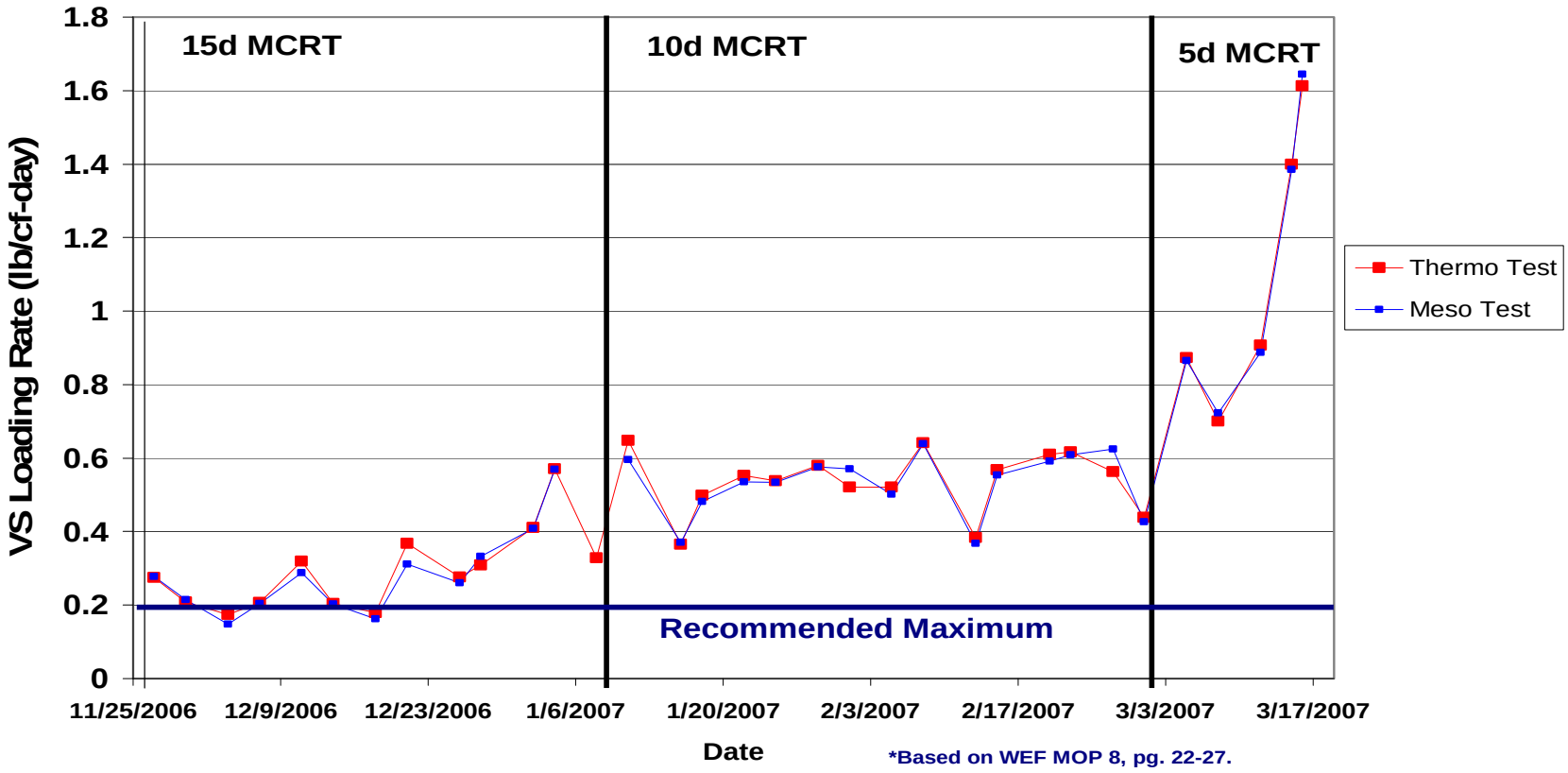
Food Waste Pulp
Volatile Solids Reduction



Food Waste Pulp
Percent Volatile/Total Solids

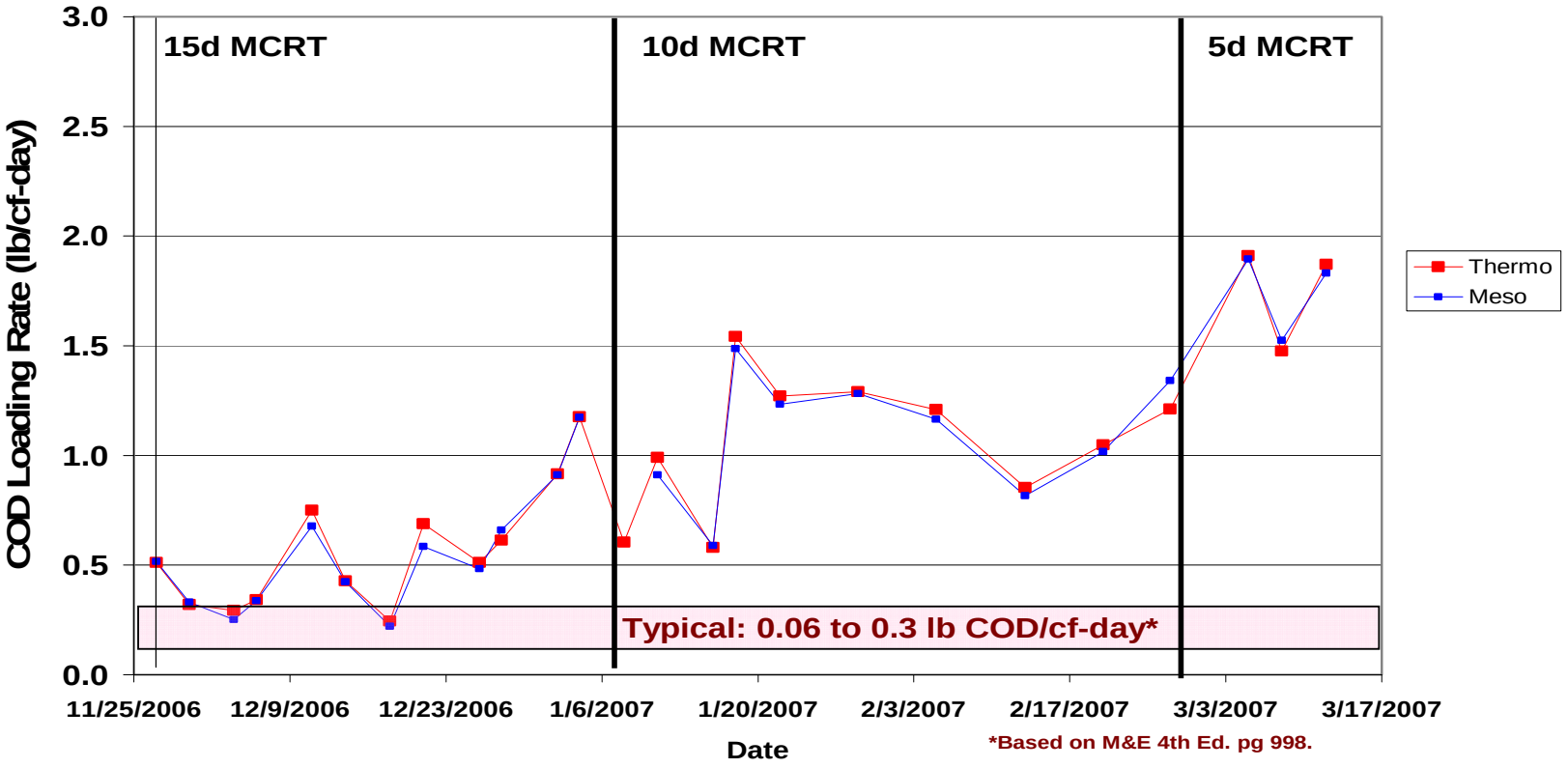


Food Waste Pulp
Volatile Solids Loading Rate

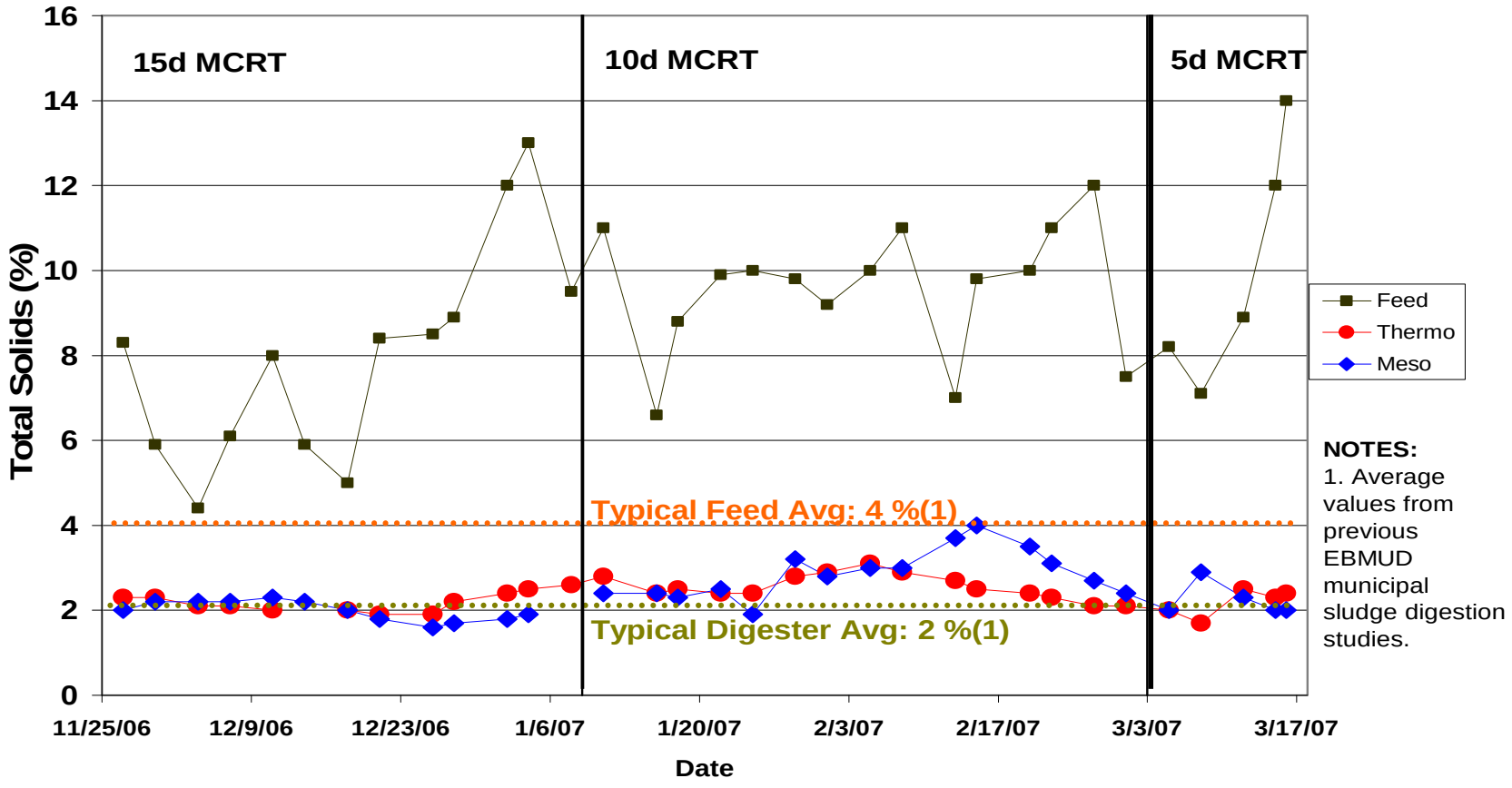


*Based on WEF MOP 8, pg. 22-27.

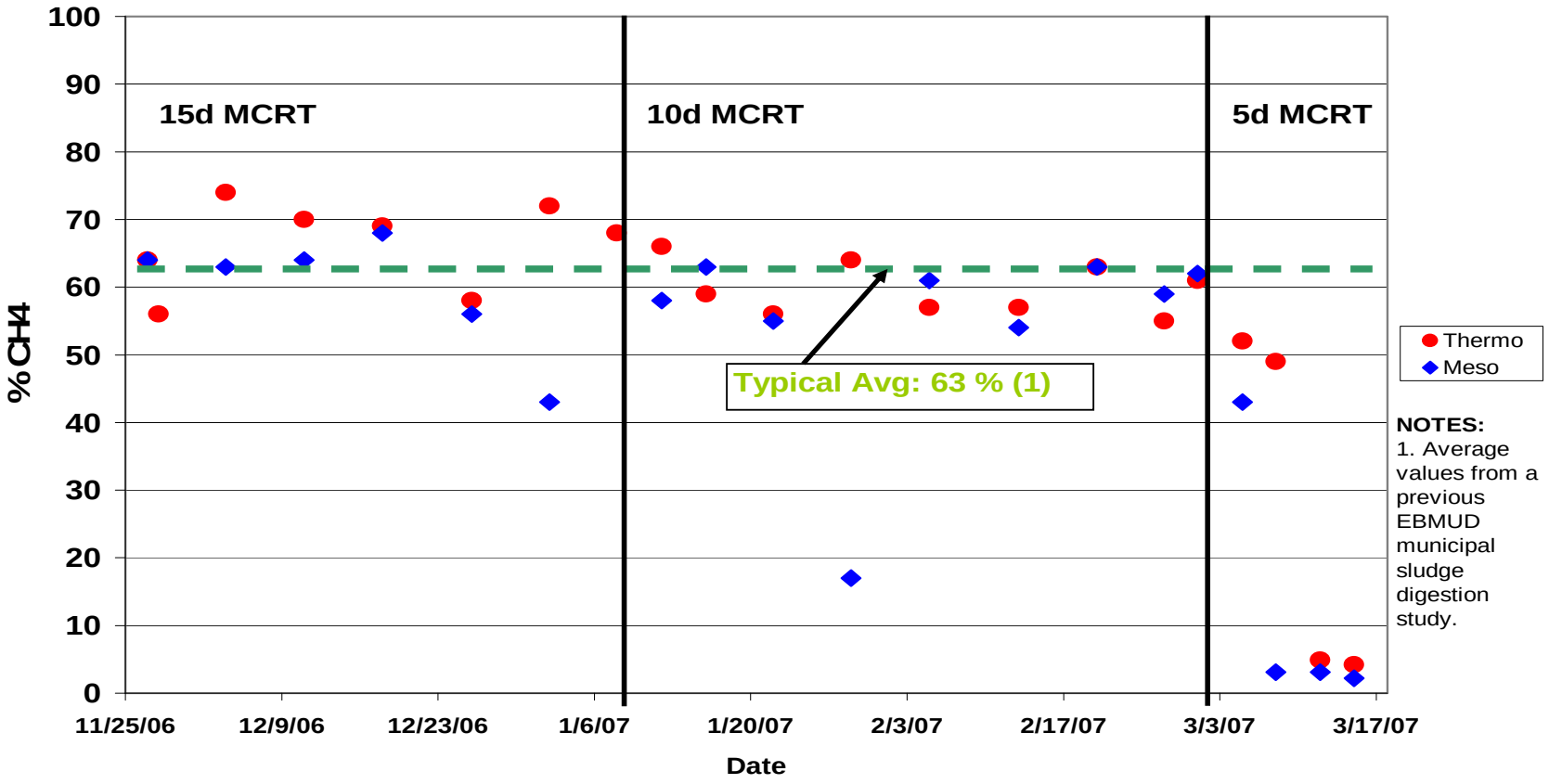
Food Waste Pulp
COD Loading Rate



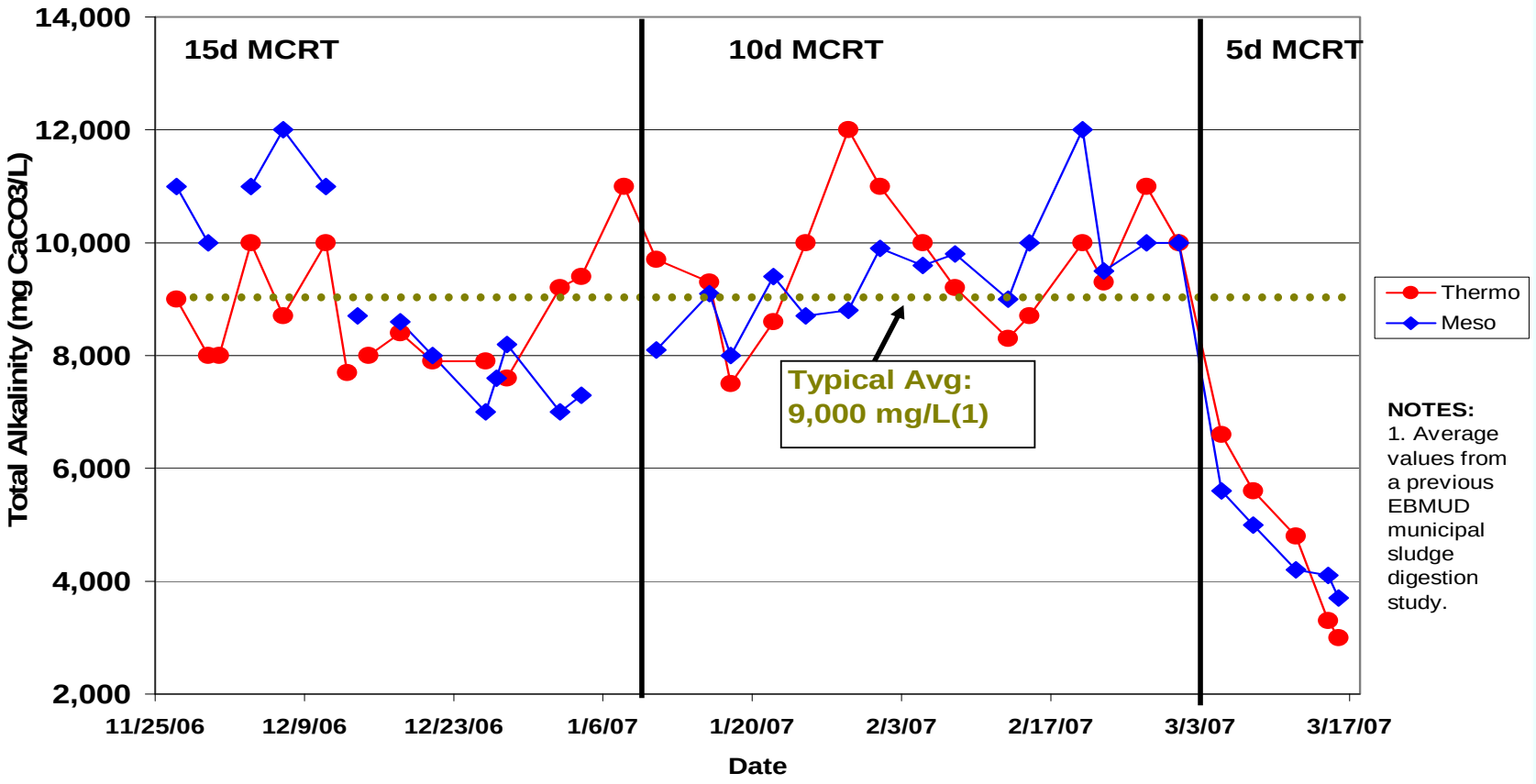
Food Waste Pulp Total Solids



Food Waste Pulp
Percent Methane in Digester Gas



Food Waste Pulp
Digested Sludge Total Alkalinity



Food Waste vs. Wastewater Solids

Parameter	Food Waste Pulp	Wastewater Solids
% VS in Feed	85-90	70-80
VS Loading (lbs/ft^3-day)	0.60 $^+$	0.20 max
COD Loading (lbs/ft^3-day)	1.25 $^+$	0.06-0.30
%TS Fed	10$^+$	4
VSD (%)	80	56
Minimum MCRT (days)	10	15
Gas Produced (l/l digester vol.)	58	17
Biosolids Produced (lbs/lbs fed)	0.28	0.55

Benefits Observed

- Food Waste *vs.* Wastewater Solids Digestion
  - Requires about half the digester volume
  - Produces about half the biosolids/lbs fed
  - Produces about 3.5 X methane/digester volume
- Provides New Renewable Energy Source
- Diverts Food Wastes From Landfills
- Significantly Reduces Green House Gases
- Wastewater Treatment Plant Permit compliance should not be impacted

Challenges Observed

- Level of Food Waste Contaminants Determines Throughput and Costs
  - Processing time can vary between 1 ½ hrs to 8+ hrs per load (10-24 tons/load)
    - Labor requirements
    - Processing capacity
  - Rejects can vary from < 10% to 70+% wet weight
  - Reject handling at higher % difficult, costly
  - Accumulation of contaminants in slurry tanks
  - Equipment appears reliable, but long-term is unknown
- Contaminants always present
  - Requires EBMUD Process or Similar
  - Pre-Grinding Necessary
  - Still Some Art Involved

Conclusions

- Exciting opportunity to bring post-consumer food wastes to wastewater treatment plants
- Many uncertainties remain to determine long-term feasibility