PLATE 2
COMPOSTING:
Aerated Static Pile

1. Suitable for the following sludge types:
- untreated primary
- lagoon stabilised
- anaerobically digested
- aerobically digested
- ATAD
- dual digested

2.Sludge Dewatering requirements:
- minimum 15% dry solids content
- maximum 40% dry solids content

3. Sludge Stabilisation requirements:
- none required but composting untreated primary sludge has an odour potential
- anaerobic or aerobic stabilisation preferred
- aerobic stabilisation for WAS from CAS or BNR (not a typical composting application)
- Air with at least 50% of oxygen remaining should reach all parts of the composting materia

4. Process description
4.1 Composting in General
Composting is the biological decomposition of organic material to produce a stable end product suitable as a soil conditioner.

Principal factors for successful composting other than adequate aeration and sufficient quantities of amendments and bulking material are:

Parameter	Value
Moisture content	40% - 60% (w/w)
Temperature for stabilisation	55°C - 60°C
Sludge pH	6 - 9
C/N ratio (w/w)	20 - 35:1 (w/w)
Composting period	8 - 18 weeks *
*Depending on which composting method is used	

During composting there are three separate stages of activity and associated temperatures observed. They are mesophilic, thermophilic and cooling stages. In the initial mesophilic stage the compost pile temperature rises to about 40 °C with the appearance of fungi and acid-producing bacteria. As the temperature rises to about 70 °C (thermophilic stage) these organisms are replaced by actinomycetes and thermophilic fungi. The maximum degradation and stabilisation of organic material occurs at this temperature range. During the cooling or curing period further water release takes place as well as pH stabilisation and completion of humic acid formation while there is a general decrease in micro-organism activity.

The water content of the sludge used for composting effects the wet weight of the mixture and therefore the amount of bulking material that is required. The wetter the biosolids being composted, the more amendments and/or bulking agent would be required. Common amendments are sawdust, grass clippings, chipped green waste and rice hulls. A widely used bulking agent is chipped wood waste. The production cost for compost is highly dependant on the availability and cost of the amendments and bulking material.

After final screening the oversized material is returned to the initial mixing step.

Area requirements would include sufficient area for the bulking and amendments materials, mixing and screening process, main composting process and storage of the final product.

4.2 Aerated Static Pile Composting Process
The sludge and bulking agent mixture is piled onto a hard stand area into which a network of pipes is fitted. The typical pile height is between 2 m and 2.5 m. Aeration is accomplished by either blowing air into the pile or drawing air down through the pile through the perforated pipes. The latter process is preferred because the foul air could be exhausted through a compost filter for odour control. A layer of screened compost may be used to cover the pile for insulation. Piles are typically aerated independently to ensure the correct temperatures. The process takes about 8-10 weeks to completion.

***5. Biosolids Classification (* EPA Victoria Draft (2002) Guidelines for Environmental Management)**
The biosolids classification is dependent on the input sludge quality and process conditions, ie temperature and composting period. Windrow processes may have difficulties consistently achieving T1 grade, while aerated processes are likely to be more reliable.

Method Class	Class	EPA Victoria Draft (2002) Requirements
Windrows Digested sludge	T1	55°C for 15 days + 30 day storage
Windrow	T2	≥53°C for 5 days or ≥ 55°C for 3 days; volatile solids reduction ≥ 38%
Windrow	T3	5 days > 40°C and 4 hours >55°C

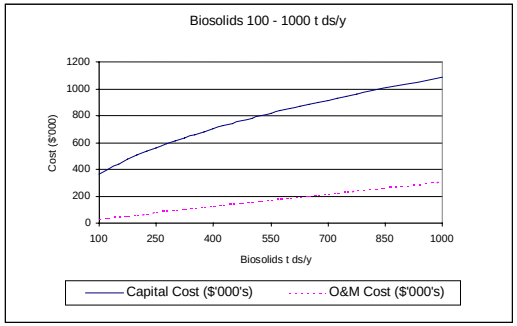
6. Market for final product
Compost market. The application will depend on its classification

7. Benefits
- good temperature maintenance & control
- enhanced odour control
- shorter (than windrows) composting period
- requires smaller footprint than windrows

8. Limitations
- high O&M cost due to mainly aeration system

9. Costs (Aerated Static Pile Composting)
[Example: for 1000 t/y capital cost is about $1.1 M and annual O&M cost is about $300 000.]

Capital and O&M Costs ($'000)
[100 – 1000 t ds/y]



10. Product sale
The price of the compost produced is estimated at approximately $30/m^3. The sale of the compost can be used to off set part of the processing cost for the sludge.

Capital and O&M Costs ($'000)
[1000 – 3000 t ds/y]