PLATE 4
LIME STABILISATION:
Conventional Lime Treatment

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

2. Sludge Dewatering requirements:
- minimum 15% dry solids content
- higher solids content preferred

3. sludge Stabilisation requirements:
- none required
- anaerobic stabilisation preferred
- aerobic stabilisation for WAS from IDEA, CAS, BNR or EA preferred

4. Process description

4.1 Lime Stabilisation in General

Lime stabilisation is carried out by mixing lime (quick lime, CaO or hydrated lime, $Ca(OH)_2$) with dewatered sludge The pathogenic micro-organisms in the sludge die off due to the high pH (12 or higher) assisted by the pasteurising temperatures achieved by the exothermic nature of the reaction of lime with the water in the sludge.

The advantage of lime stabilised biosolids is that it will not become septic as long as the high pH is maintained. The major cost for these processes are the cost of lime.

Lime stabilised biosolids are particularly suitable for application to agricultural land because of their liming value, although application rates may be limited by the lime content. The optimum application rate is site specific.

The optimum lime to sludge ratio needs to be determined for each individual case. The lime requirement will depend on the type of sludge, organic composition and solids concentration of the sludge.

The table below provides a guide for typical lime requirements for pretreatment sludge stabilisation.

Sludge Type	Lime ($Ca(OH)_2$ requirements (w/w)
Primary sludge (untreated)*	0.06 - 0.17kg/kg ds
WAS* from IDEA	0.21 - 0.43 kg/kg ds sludge
Anaerobically digested mixed sludge 0.14 – 0.25 kg/kg ds	

*Dewatered to at least 15% dry solids

4.2 Conventional Lime Treatment Process

In the conventional lime treatment process the dewatered biosolids cake is mixed with lime (hydrated or quicklime) in a pug mill to raise the pH of the mixture to above 12 for 2 hours. When quicklime is used the temperature of the mixture raises to above 50°C.

Often reported problems are odours, largely as a result of ammonia stripping, and poor mixing of lime with dewatered biosolids. Special attention to mixing and odour scrubbing is required.

Conventional lime treatment generally does not achieve the same level of pathogen reduction as the proprietary processes. Stockpiling and windrowing is required to achieve complete pasteurisation.

5. Biosolids Classification **(EPA Victoria Draft (2002) Guidelines for Environmental Management)**

The sludge classification is dependent on the process conditions, ie temperature and pH and the time for maintenance of these conditions:

Method Class	Class	EPA Victoria Draft (2002) Requirements
Conventional Lime Treatment	T1	>52°C for >12 hours and pH > 12 for 3 days and air dried with >50% ds

6. Market for final product

Land application in mainly agriculture - application depending on classification

7. Benefits
- liming property of final product to agriculture
- Simple to operate

8. Limitations
- moderate capital cost
- high O&M cost
- inadequate mixing could result in poorly stabilised product
- Increase of solids mass to be disposed of

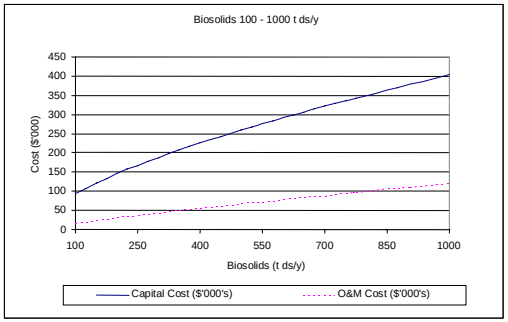
9. Costs (Conventional Lime Treatment)

[Example: for 1 000 t/y capital cost is $400 000 and annual O&M cost is $120 000]

10. Product sale

The price of the biosolids produced is expected to be approximately $5 to $20/$m^3$ which is mainly due to the lime value contained. The sale of the biosolids can be used to off set part of the processing cost for the sludge.

Capital and O&M Costs ($'000)
[0 – 1 000 t ds/y]



Capital and O&M Costs ($'000)
[1 000 – 3 000 t ds/y]