PLATE 6
LIME STABILISATION: N-VIRO[TM] Soil

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. The optimum application rate is site specific.

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 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.

Sludge Type	Lime requirements (w/w)	Alkaline admixture requirements (w/w))
Primary sludge untreated*	25% - 50% sludge wet weight	20-40%
WAS* from IDEA	25% - 50% sludge wet weight	60-100%
* Dewatered to at least 15% dry solids		

4.2 N-VIRO[TM] Soil Process

In the N-VIRO[TM] Soil process a large proportion of cement kiln dust (CKD) is used to minimise cost. The process relies on mixing dewatered biosolids with quicklime and CKD in a proprietary mixer. From the mixer the blended materials are discharged to a stockpile before being windrowed. Complete pasteurisation is not achieved until after stockpiling and appropriate windrowing.

The lime & CKD requirement is about 40 – 75% (w/w) of the sludge processed. This increases the total solids to be disposed of by the same amount. Because of the large quantities of materials added to the sludge, a significant dilution of chemical contaminant levels is achieved.

The process can reduce pathogens dramatically and produce a product that would be suitable for various uses including landscaping, agricultural land spreading and site rehabilitation.

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

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

Method	Class	EPA Victoria Draft (2002) Requirements
N-VIRO[TM] SOIL	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
- Produces a granular product which is easy to be applied to land

8. Limitations

- high capital cost
- high O&M cost
- potential odours
- Availability of CKD at low cost

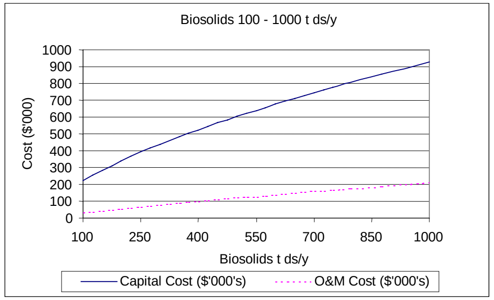
9. Costs (N-Viro[TM] Soil)

Example: for 1 000 t/y capital cost is $920 000 million and annual O&M cost is $200 000

10. Product sale

The price of the biosolids produced is expected to be approximately $20 to $35/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)
[100 - 1 000 t dsy]



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