PLATE 8
INCINERATION

1. Suitable for the following sludge types:
- untreated primary
- lagoon stabilised
- anaerobically digested
- aerobically digested
- ATAD
- dual digested
- WAS from IDEA, CAS, BNR & EA

2. Dewatering requirements:
- minimum 15% - 20% dry solids content
- 30% dry solids content is preferred

3. Stabilisation requirements:
- none required

4. Process description
Incineration is the complete thermal destruction of materials to their inert constituents in the presence of oxygen. For sewage sludge the process yields a weight reduction of well over 90% of the input sludge.

There are mainly two types of incinerators namely the multiple hearth and fluidised bed with the latter technology superior to that of the former. Fluidised bed incinerators offer better control of combustion conditions and hence more complete and reliable combustion.

Sewage sludge has a volatile component, a fixed carbon component and contains organics which are usually non-combustible. The main gas from the incineration process is carbon dioxide (CO_2). The dewatering of sludge (usually untreated) prior to feeding it into the incinerator is a critical step for the process of combustion. Producing a drier sludge results in less fuel required for incineration.

If sludge is dewatered to at least 30% dry solids 'autogenous' combustion will result that is sludge will burn without the need for supplementary fuel except on plant start-up. Addition of combustible material to the dewatered sludge is sometimes practiced to augment its heat value in relation to its moisture.

Obtaining these high solids contents often requires thermal conditioning of sludge. The benefit of thermal conditioning (as opposed to polymer addition, ferric salt and/or lime conditioning and ash addition) is the quality of the sludge generated. The sludge cake contains no additional inert solids which negatively affect the incineration process or the flue gas quality.

The purpose of the incineration of sewage sludge is to:
- dry the sludge cake
- destroy the volatile content by burning (at 760 °C to 980 °C)
- produce a sterile residue or ash and
- produce a flue gas to zero visible emissions

Incineration of sludge has been carried out at Canberra's Lower Molonglo Wastewater Treatment Plant since 1978.

5 Biosolids Classification **(EPA Victoria Draft (2002) Guidelines for Environmental Management)**
The biosolids classification for the incineration of sludge is not specified in the EPA Victoria Draft (2002) Guidelines. The only solid product from the process is, however, a sterile ash. It is therefore assumed that it would have a T1 classification for unrestricted use.:

6. Market for final product
Sterile ash to agriculture (for liming purposes) or building industry.

7. Benefits
- maximum reduction in sludge volume
- destruction of pathogens and the majority of toxic organic compounds
- containment of odours and dust
- relatively compact process requiring small footprint
- sterile ash can be used in agriculture and building industry

8. Limitations
- high capital cost
- high O&M cost
- air emissions (including oxides of sulphur and nitrogen) may have adverse environmental effects
- only suitable for very large scale operations

9. Costs (Incineration)
Typical capital costs and/or operating costs are not available and are expected to be site specific.

The following indicative cost example may be useful: For an installation with a 24,000 dry tonne per day capacity the approximate capital cost is expected to be in the region of $25 to $30 million. In the experience of the Lower Molonglo Wastewater Treatment Plant the O&M cost is approximately $120 per tonne. This cost includes, however dewatering, incineration and transport of the ash. (*Source: Dymke et al. Incineration - An Alternative Method for Managing Sewage Biosolids, Wastewater Disposal and Water Management in Australia July/August 1998*)

10. Product sale
The price of the ash produced is difficult to estimate at this stage because it has not been produced and sold here.