SLUDGE TYPES AND STABILITY

It is important to be familiar with different sludge generation and use/disposal options. Figures 3 and 4 illustrate just two examples of how different sludge types are generated and the relative stability of the sludge. Many other processes and process configurations exist. For example, in Figure 3, primary sludge is stabilised by anaerobic digestion, followed by another disinfection step. Primary sludge can also be stabilised and disinfected by lime treatment in one step. Note that less sophisticated processes can also be used to stabilise sludge. For example, the sludge from an oxidation pond, if left for a long time could be adequately stabilised.

In the past confusion and misconceptions existed regarding the concept of a “stable” sludge. It is important to clearly distinguish between “stable”, “disinfected” and/or “dewatered” sludge.

**Stable sludge:** The sludge has been treated to reduce volatile organic matter, vector attraction and to reduce the potential for putrefaction and offensive odours.

**Disinfected sludge:** The sludge has been subjected to a process that destroys, inactivates or reduces pathogenic micro-organisms.

**Dewatered sludge:** The sludge has been subjected to a process that reduces the water content of sludge to minimise the volumes for transport and improve handling characteristics. Typically, dewatered sludge can be handled as a solid rather than as liquid matter.

Note that separate processes are not necessarily required to achieve a stable, disinfected and dewatered sludge. For example, if you dewater sludge to levels above 90% solids content, you have both a stable and dewatered sludge.

BEST MANAGEMENT PRACTICES

Irrespective of the management option adopted, good sludge management practices will be required. This includes understanding and managing the full life cycle of the sludge streams generated at a wastewater treatment plant to ensure appropriate use and disposal.

Figure 5 illustrates conceptually how a life cycle assessment can be used to manage sludge. It is particularly important to understand the source of possible pollutants that might restrict the use and disposal of the sludge. Equally important is the management and operation of the wastewater treatment plant to generate a stable sludge which does not generate any odours or attract disease vectors. If the resulting sludge does not meet the required standards, this information should feed back to the operation of the plant and wastewater source control. Managing the full life cycle of the sludge generation, handling, use and disposal will ensure continuous improvement.
Figure 3: An example of an Activated Sludge wastewater treatment plant showing sludge stabilisation and dewatering options

Figure 4: An example of a Trickling Filter wastewater treatment plant showing sludge stabilisation and dewatering options
## POTENTIAL PROBLEMS

Potential source for:
- Metal
- Organic pollutants
- Pathogens

Potential for odours, vector attraction due to inadequate treatment or operational problems

Potential for legal and/or public intervention

### MITIGATION

- Source control for pollutants
- Effective treatment and operational control
- Effective monitoring and feedback to implement corrective action

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**Figure 5: Life-cycle assessment to manage sludge quality**