

SA Water's Experience in reducing storage times to achieve Grade A Biosolids

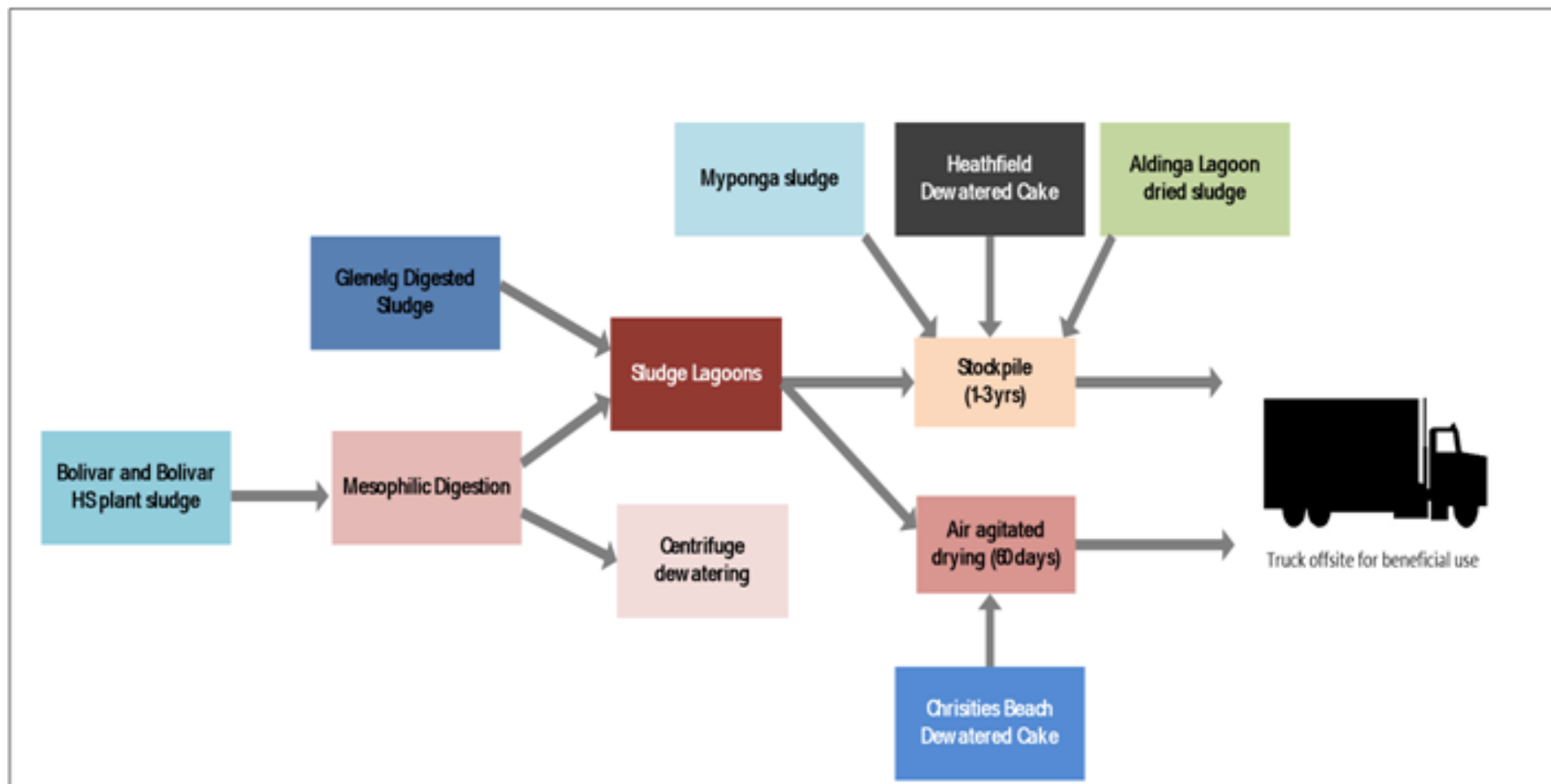
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Biosolids overview

- 24 WWTPs
- produces 30,000 dry tpa biosolids
- 85% metro and 15% regional
- Principal beneficial end use is broad acre farming
 - Long term stockpiling, landfill and co-composting
- Stockpile storage reduced from 7 years to 3 years (Roder *et al.*, 2004)



Current Sludge Treatment and Management



Project aims

Monitor

- Challenge the 3 year storage requirement
- Microbial numbers
- Solids characteristics
- Newly stored and aged biosolids

Evaluate

- Abundance/presence of pathogens over sludge treatment train
- Raw, digested sludge and biosolids stockpiles
- Helminths and adenovirus

Approval

- Grade A and Grade B
- Department of Health and Ageing
- SA EPA

SA EPA 2017 Draft Guideline Requirements

Stabilisation Grade A

< 100 *E. coli* /g TS (dw)

<1 *Salmonella*/50g TS (dw)

< 1 virus/50 g TS (dw)

< 1 viable helminth ova/50g TS (dw)

Storage for a minimum of 3 years

Stabilisation Grade B

< 1000 *E. coli* /g TS (dw)

Storage for minimum of 1 year

Vector Attraction Reduction

≥75% dry weight solids content

Or ≥38% VS destruction

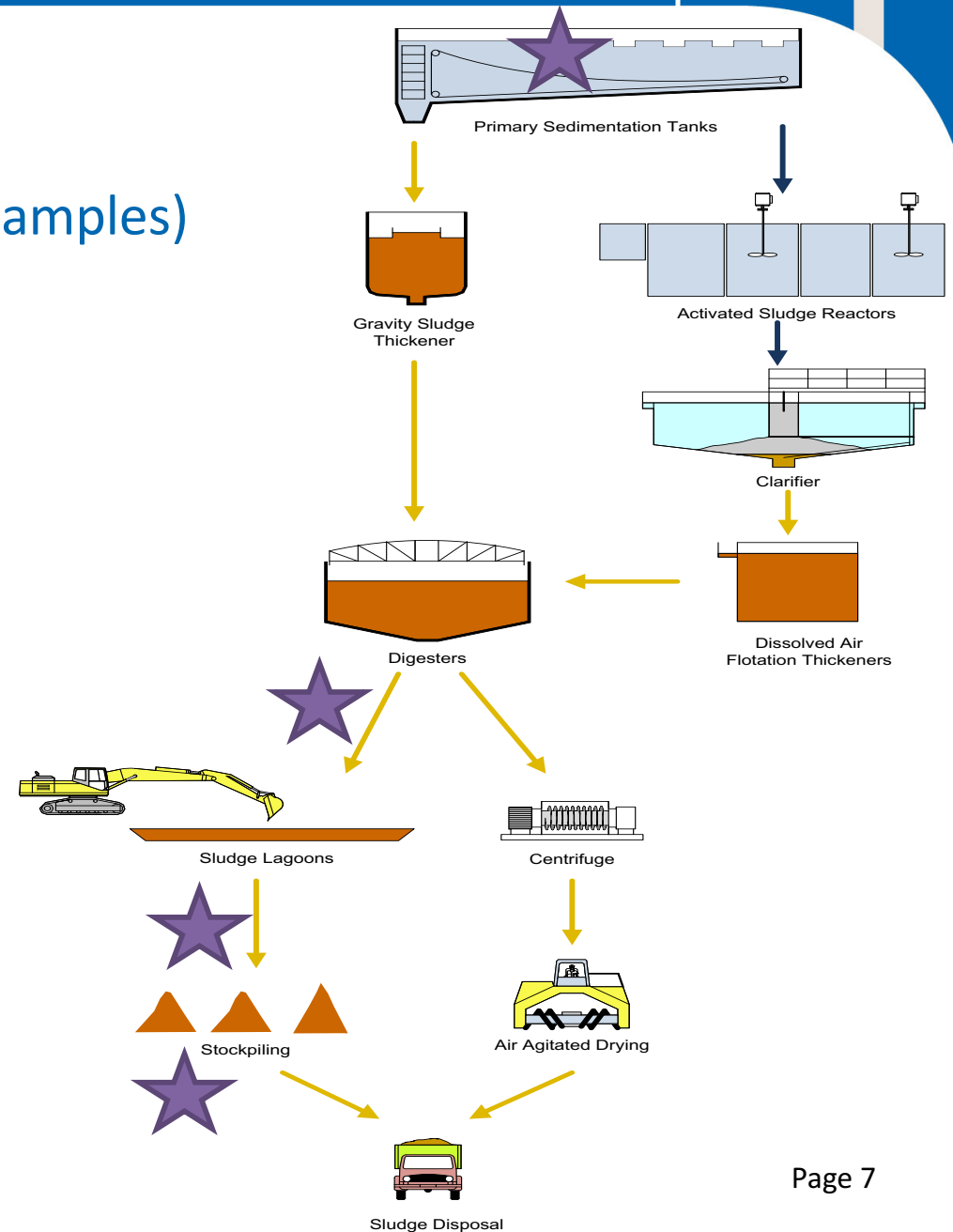
Sampling program & methodology

- 0/12/18/24 months
- Follow up sampling was initial plan

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Sampling Locations

- Primary sludge (6 day rolling, 20 samples)
 - Helminths
- Digested sludge (3 grab samples)
 - Helminths
 - Virus
 - *E. coli*
 - *Salmonella*
- Fresh & stored biosolids (cores)
 - Helminths
 - Virus
 - *E. coli*
 - *Salmonella*
 - Solids (total & volatile)



Microbiology Results



- **No** Helminth ova (*Ascaris* and *Taenia*) detected
- 20 samples analysed (January – May 2017)



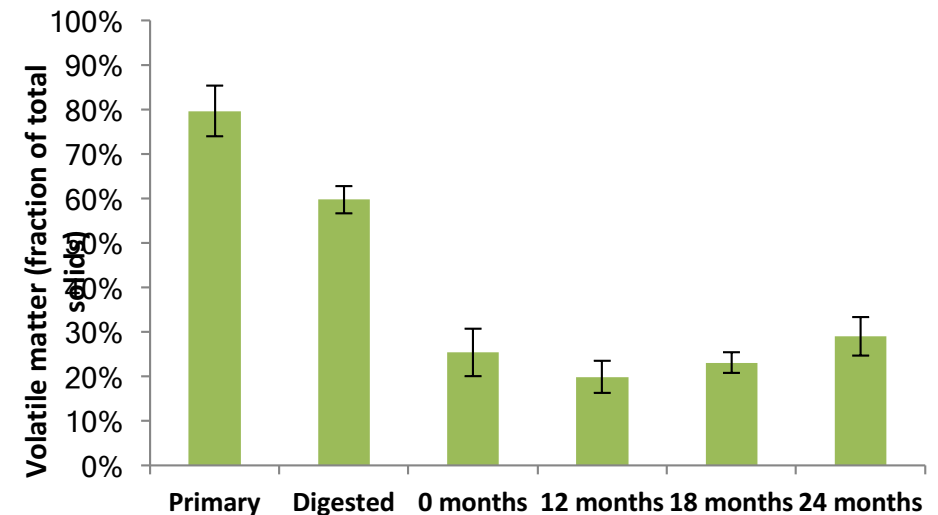
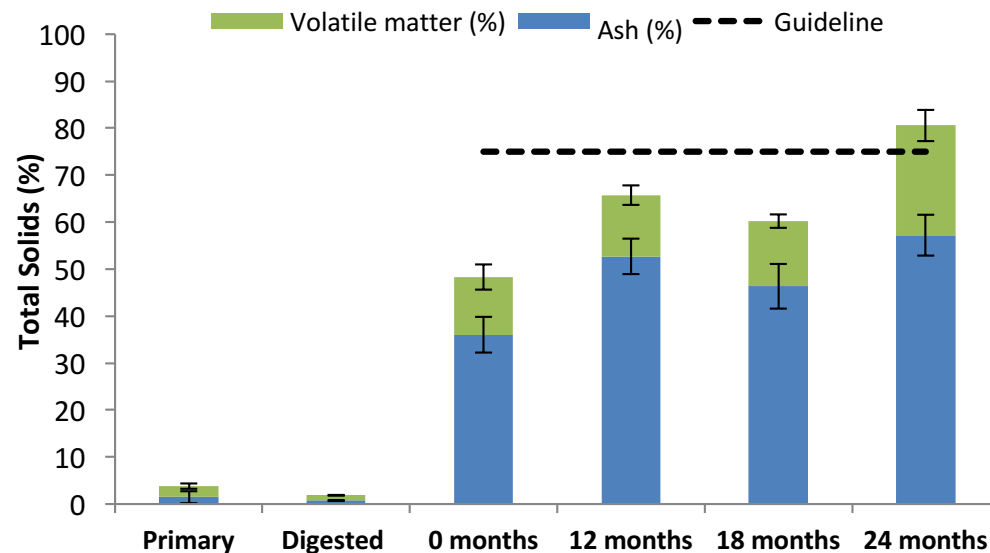
- **No** helminth ova detected (3 samples)
- *E. coli* average = 9.3×10^5 MPN/g
- *Salmonella* detected
- Enteric adenovirus **detected** average 156 MPNIU/g dw



- 10 samples analysed from each time point
- **No** helminths ova (*Ascaris* and *Taenia*) detected
- Freshly stored *E. coli* 3.7 MPN/g, no *Salmonella*, adenovirus 16 MPNIU/g
- Aged stockpiles (12, 18 and 24 months) **No** adenovirus, *E. coli* or *Salmonella* detected

Solids characteristics

- Sampling occurred in dry weather conditions (per guidelines)
- Vector attraction reduction (VAR)
 - $\geq 75\%$ dry weight solids
 - VS destruction $\geq 38\%$, achieving 50%



Conclusions

- No helminths detected in any samples at Bolivar WWTP
 - Primary sludge / digested sludge / biosolids
- None of the selected microbial indicators/pathogens were detected in the stored stockpiles
 - 12 / 18 / 24 months
 - 6 month stockpile to be analysed
 - $\geq 75\%$ solids in 24 month stockpile OR $\geq 38\%$ VS destruction
- Wet summer period than usual impacting TS (dryness)
- Consider alternative end point process for farmers
- Potential to assess lagooning for LRV
- Discussions with EPA/DHA for approval 1 year storage Grade A

Questions



Overview of SA biosolids guidelines

- Class A approved process
 - Long term storage: Sludge is anaerobically digested, dried to achieve a minimum solids content >10% by weight and then stored for at least **3 years**
- Class B approved process
 - Medium term storage: Sludge is anaerobically digested, dried by lagoon evaporation and then stored for at least **1 year** to achieve a minimum solids content **>75% by weight**.
 - Anaerobic digestion: Anaerobic conditions are maintained for a period of between 15 days at 35 to 55°C and 60 days at 20°C.
 - Agitated air drying: Centrifuged cake mixed with an equal volume of previously dried biosolids and turned to mix and dry aged not less than 60 days and not less than 50% solids.
- *Other processes will be approved providing it is demonstrated that they reliably achieve Stabilisation Grade A / B microbiological quality requirements.*

Rainfall

- Wet summer period '16 -'17

