CHALLENGES ASSOCIATED WITH DRY SANITATION

Jay Bhagwan

FSM SEMINAR, DURBAN
MARCH 2010

OUTLINE

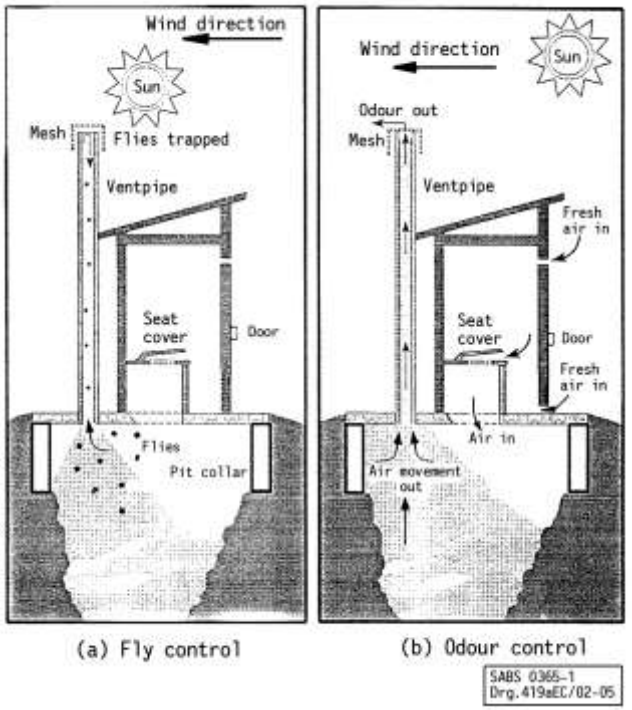
- INTRODUCTION
- CHALLENGES
- WHAT IS HAPPENING IN PITS
- RESEARCH
- INTERVENTIONS TO DEVELOPE BARRIERS
- NEW APROACHES





INTRODUCTION

- 3 TYPES
  - VIPs
  - Urine diversion
  - Composting
- Design of VIPs
  - Anaerobic digestion
  - 10 year design of pit
  - Sufficient to kill all pathogens
  - Safe to handle material



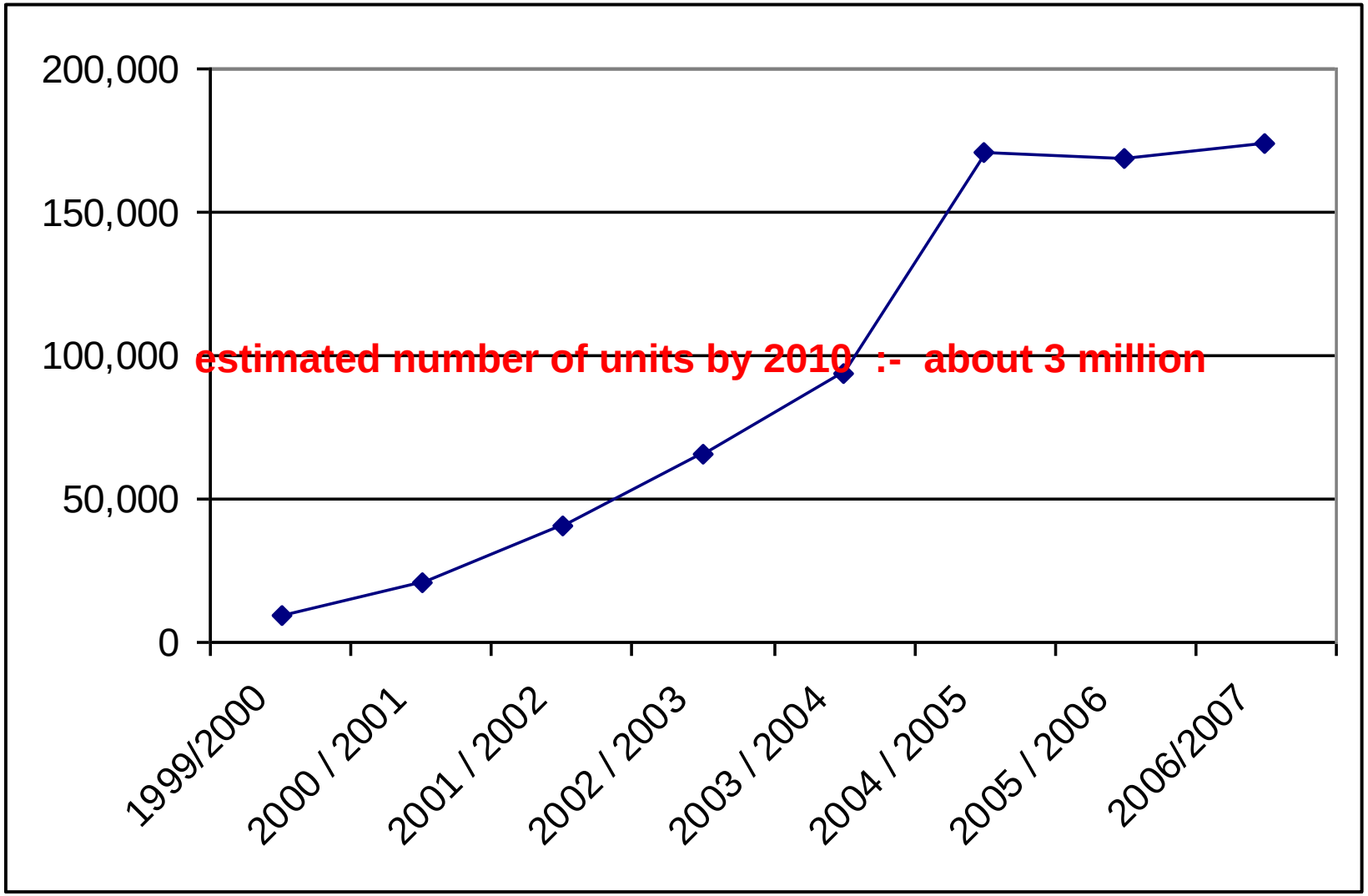
INTRODUCTION

- Urine diversion
  - Dehydrating
  - Up to 2 to 3 year design life depending on the option
  - Most of the pathogens are killed
  - Needs to be composted to reuse

CHALLENGES WITH BASIC SANITATION

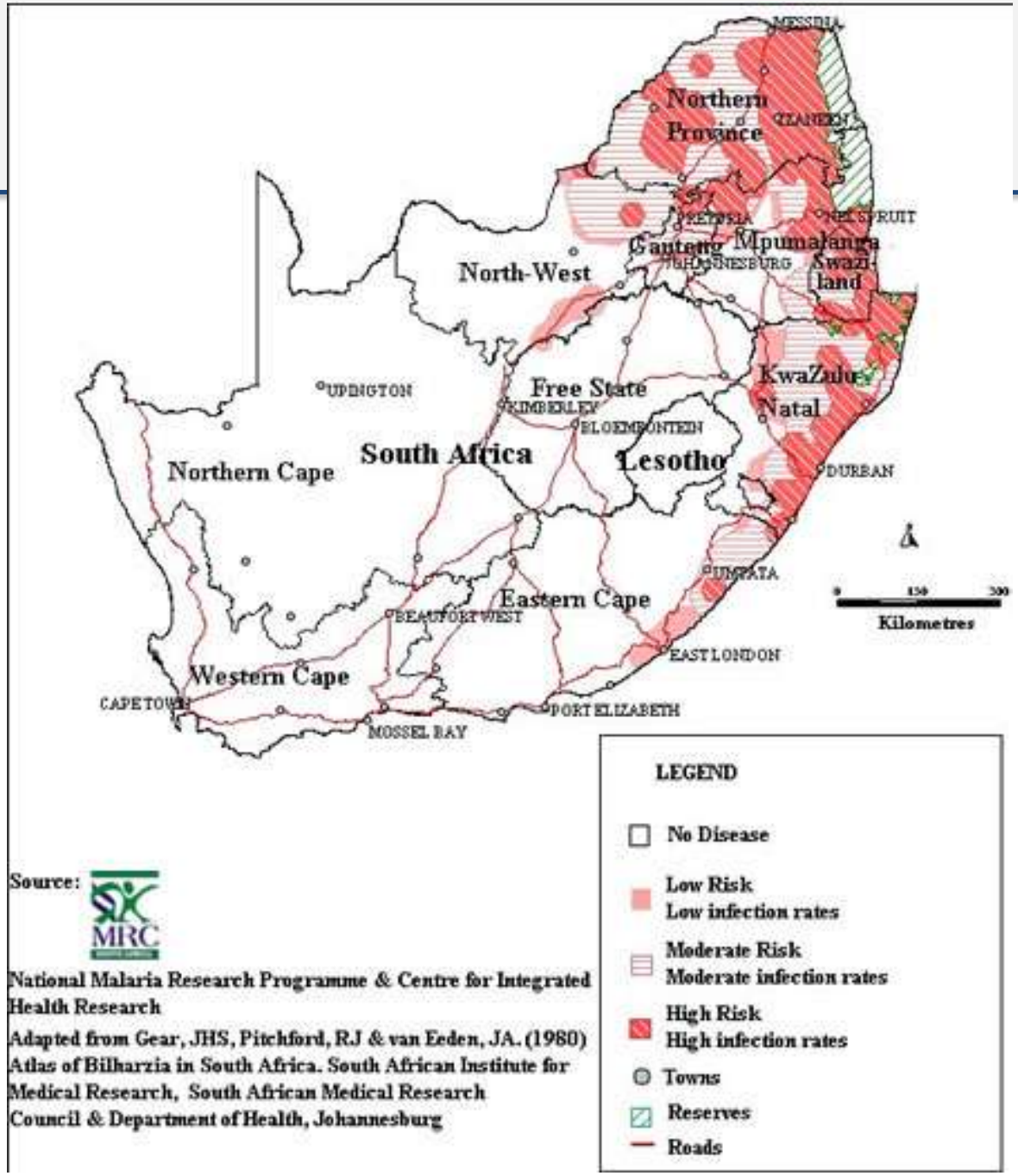
- pits filling faster than design
- access to pits is a challenge
- pit desludging is expensive
- systems seen from a civil engineering and project management perspective
- no holistic management
- focus on superstructure

So what happens when the pit FILL UP?



HANDLING VIP CONTENTS – A HUGE RISK

Photo: P Blunier,


Northern Province
North-West
Gauteng
Mpumalanga
Swazi-land
Free State
KwaZulu Natal
Northern Cape
South Africa
Lesotho
Eastern Cape
Western Cape
UPINGTON
KIMBERLEY
BLOEMFONTEIN
DURBAN
BEAUFORT WEST
EAST LONDON
CAPE TOWN
PORT ELIZABETH
MOSSEL BAY
Kilometres
LEGEND
No Disease
Low Risk
Low infection rates
Moderate Risk
Moderate infection rates
High Risk
High infection rates
Towns
Reserves
Roads
Source:
MRC
National Malaria Research Programme & Centre for Integrated Health Research
Adapted from Gear, JHS, Pitchford, RJ & van Eeden, JA. (1980) Atlas of Bilharzia in South Africa. South African Institute for Medical Research, South African Medical Research Council & Department of Health, Johannesburg

WHATS HAPPENING IN PITS……..?






NEXT WE CAN HOST THE OLYMPICS……

RESEARCH IN SCIENCE BEHIND DRY SANITATION

- Last 40 years very little afforded to dry sanitation systems scientifically
- Much based on theory and hyphothesis
- Lack of evidence OF WORKING OF PITS

WRC Research

- Characterising faecal sludges from dry systems
- Understand sludge decomposition
- Efficacy of additives
- Pathogen survival





INTERVENTIONS

- **FOUR** pronged approach:
  - ❑ **understand what is happening in pits**
    - science of what is happening in pits
    - pit additives
    - sludge accumulation
  - ❑ **desludging techniques**
  - ❑ **Management OF SLUDGES**
    - beneficial use
  - ❑ **better construction techniques.**
    - making structures lighter



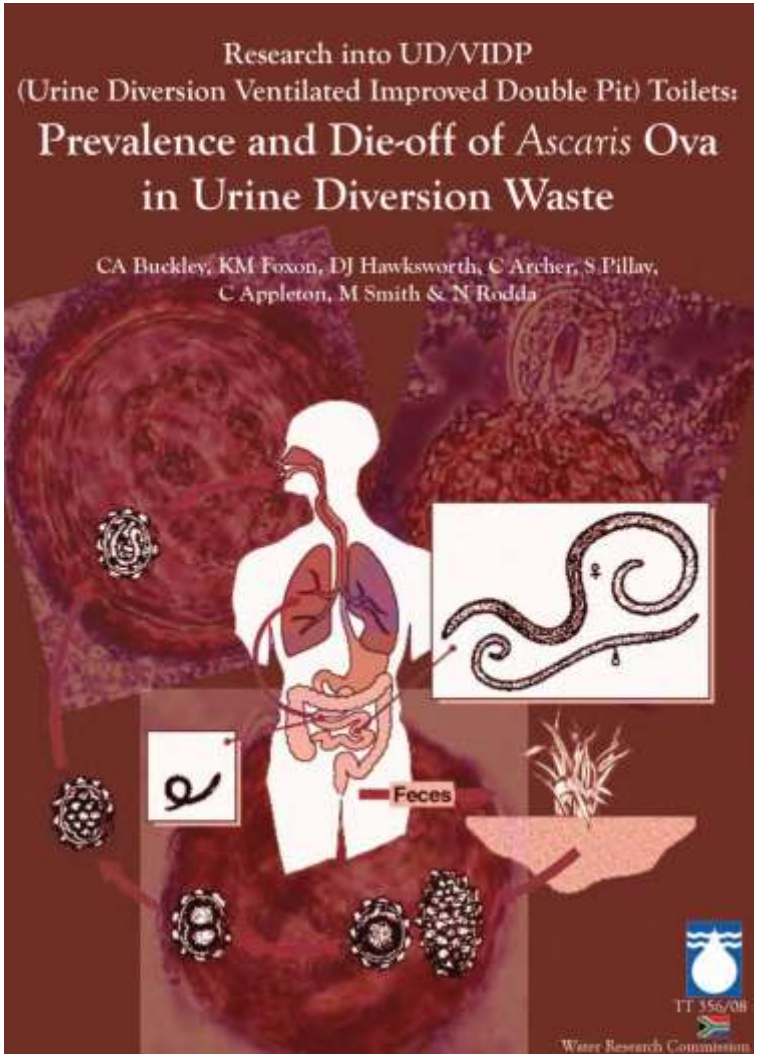


WRC Research

- FOUR pronged approach:
  - understand what is happening in pits
    - science of what is happening in pits
    - pit additives
    - sludge accumulation
  - desludging techniques and management
    - beneficial use
  - better construction techniques.
    - making structures lighter
  - Policy and institutional

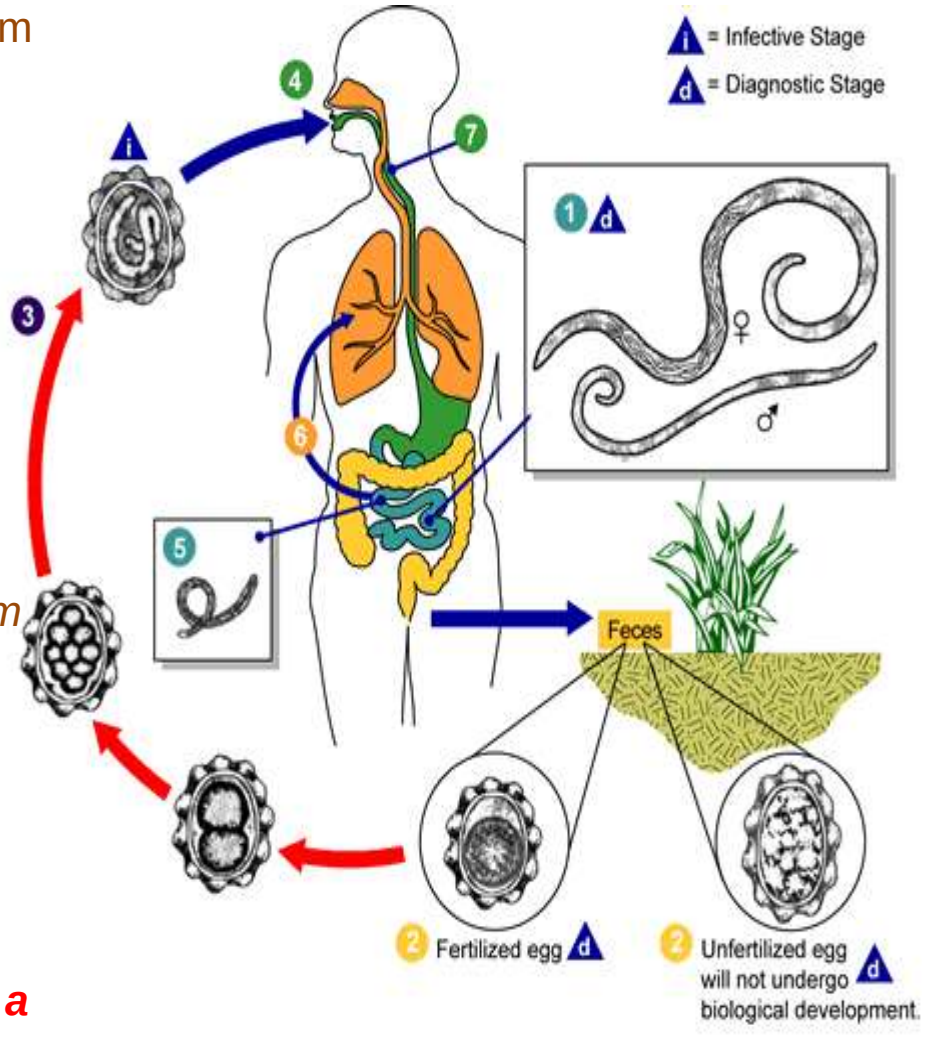
Pathogen survival

- Developed a new technique (AMBIC) to measure ascaris eggs in sludges (ammonium bicarb)
- Test consistently showed large counts of live ascaris ova for different sludge ages
- Infact we had live counts for ascaris eggs in sludges which were



HYGIENIC RISKS - Infection is rife (endemic)

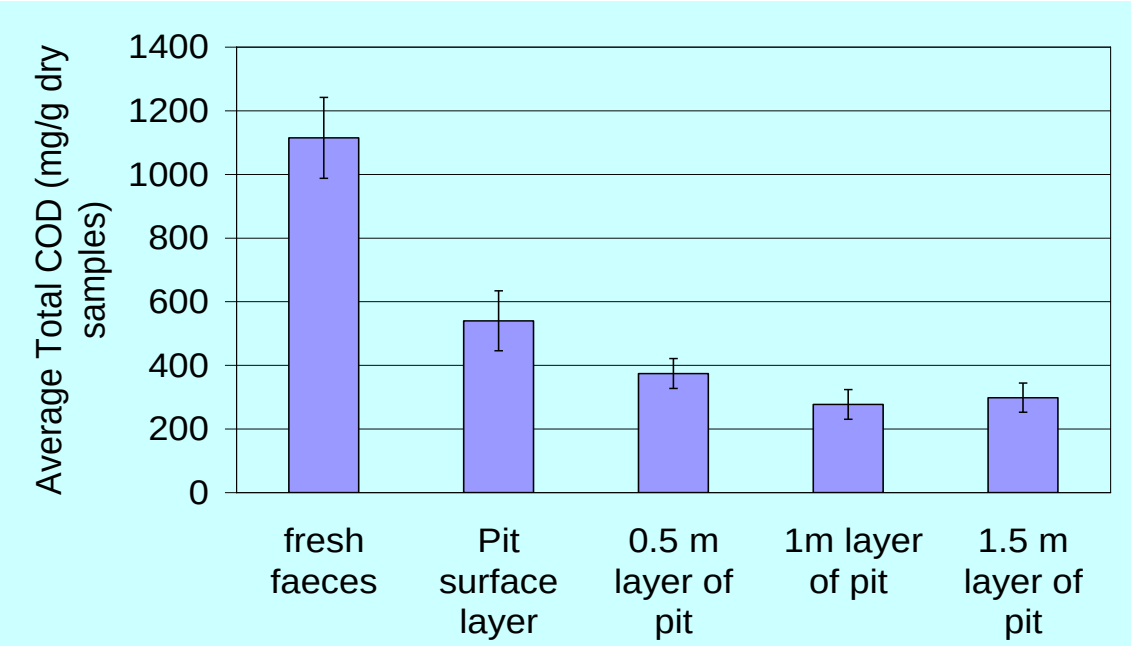
- study on faecal material in toilets from 120 households for helminthic and protozoan parasites
  - 10 % were negative for both parasites
  - 60% had *Ascaris*
  - 55% had *Giardia*
  - 50% had *Trichuris*
  - 21% had *Cryptosporidium*
  - 11% had *Taenia*
  - 60% had either *Cryptosporidium* or *Giardia*
- ***very poor community health***
- ***uncontrolled release to the environment will have severe health consequences***
- ***That is handling and reuse of sludges without pasteurisation is a huge risk***

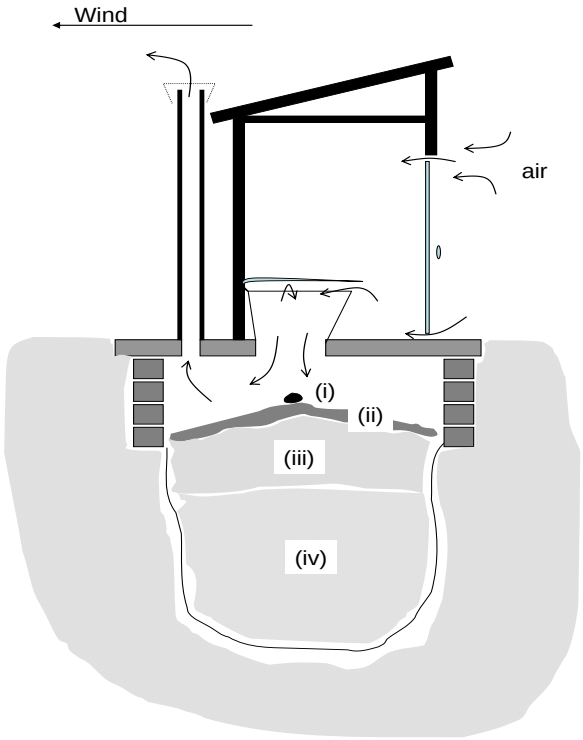


What happens in a pit? *The science.....*

- NO TWO PITS ARE HOMOGENOUS
- PIT CONTENTS ARE NOT HOMOGENOUS

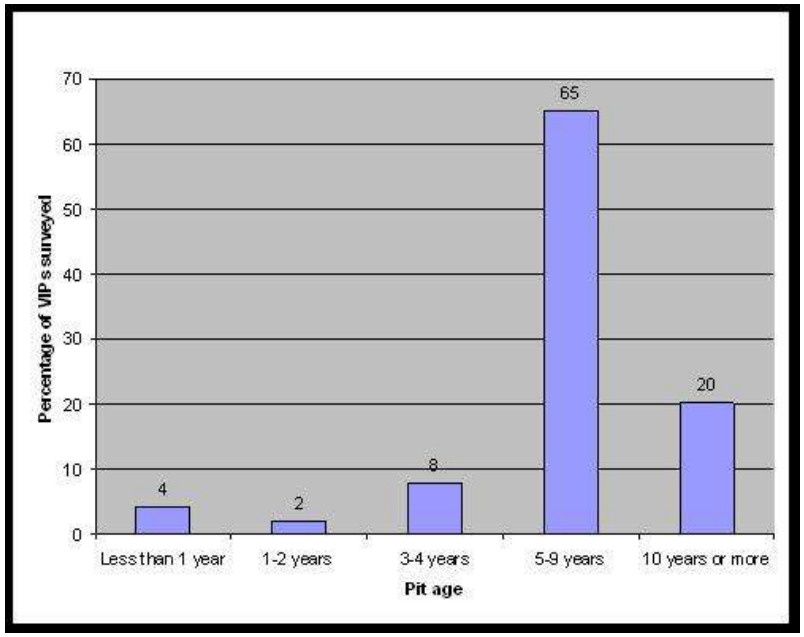
I. fast degradation on top
II. slows when covered
III. very slow low down
IV. pathogens throughout the depth





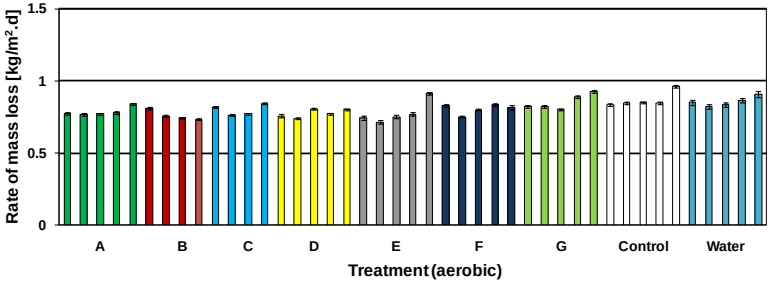
Pit accumulation

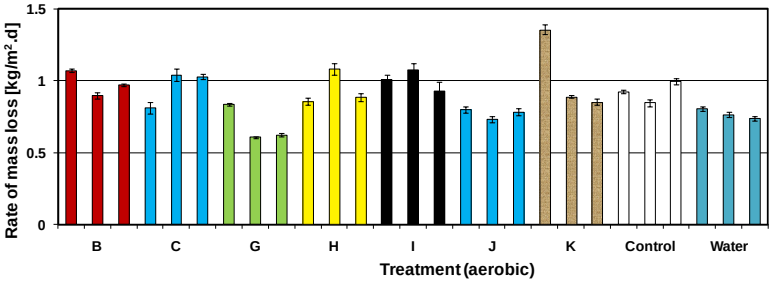
The WSAs surveyed indicated that there were over 1million VIPs within their jurisdiction. They estimated that 85% of these are older than 5 years



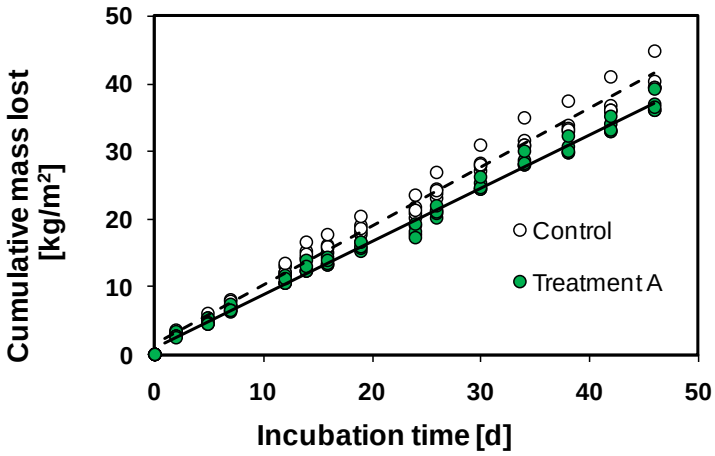
VIP additives

- photographic determination of filling rates
- tested the effect of commercial additives on VIP contents under laboratory conditions
- separated and quantified the effect of the commercial pit latrine additives from the effects of natural processes within the pit



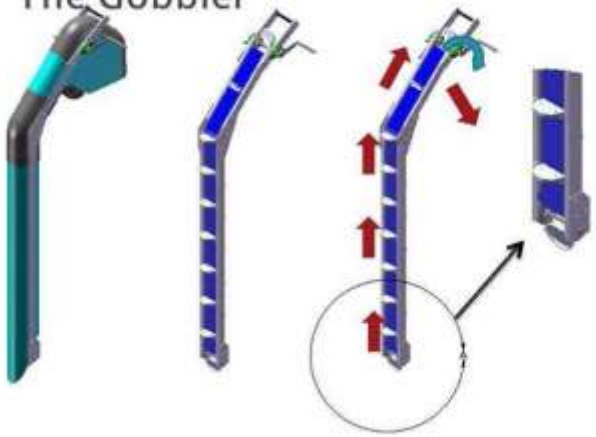


This study found no evidence to support claims that commercial pit latrine additives can significantly influence sludge accumulation rates in pit latrines.

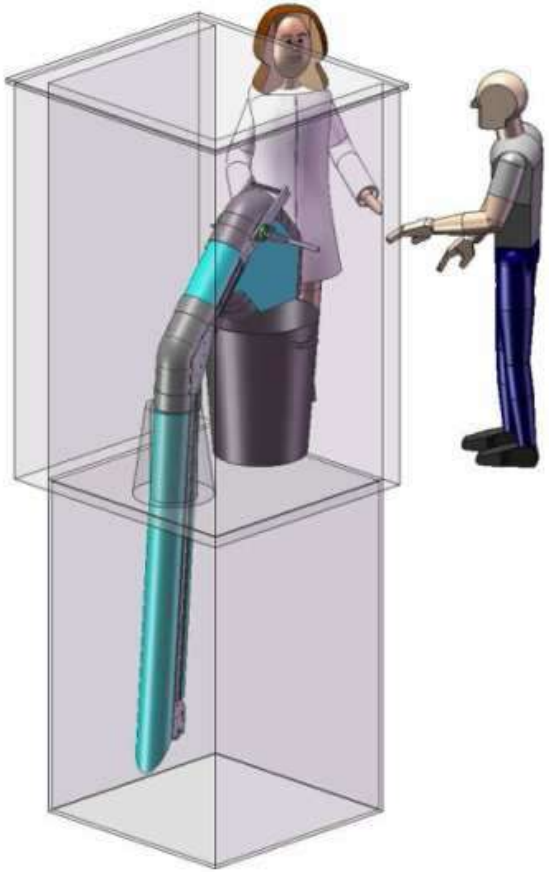


Pit desludging

The Gobbler



The Nibbler



The Nanovac

SLUDGE MANAGEMENT – DEEP ROW TRENCHING *alias Ethekweni e-ponds*

Eucalyptus trees at planting and after 9 months, deep row entrenchment site, Umlazi, Durban

Lightweight superstructures

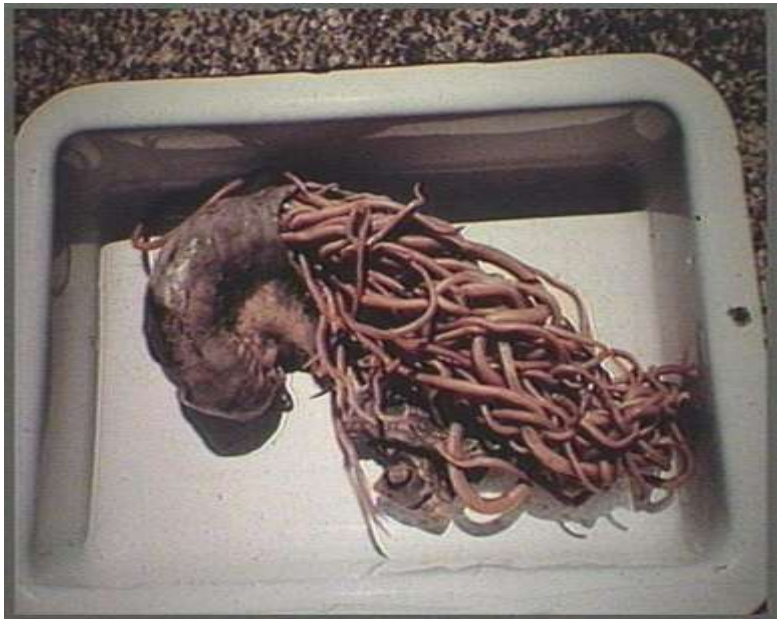






- Weighs under 700kg, including the slab.
- Can be used for retrofit
- 100 mpa strenght
- Material costs under R2000 (2008 Builders warehouse)
- High strength used in road building
- Easy access to pits
- Can avoid large pits and lining in good soils.

THANK YOU



Prof GP Hadley
Department of Paediatric Surgery
Nelson R Mandela School of Medicine