

# Methods for Faecal Sludge Analysis

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## Methods for Faecal Sludge Analyses

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# Project context

The importance and need for faecal sludge management (FSM) has been recognised worldwide. One major gap in developing appropriate and adequate faecal sludge (FS) treatment and monitoring techniques is the ability to understand FS characteristics, its quantification and correlation to source population.

Faecal sludge is highly variable, but as standard methods for sampling and analysis do not exist, results are not comparable and hence the actual variability is not yet fully understood.

Due to the lack of standard methods for sampling and analysis of FS, standard methods from other fields are usually applied (e.g. water, wastewater and soil science). However, they are not necessarily the most suitable and have not been specifically adapted for FS.

Characteristics of faecal sludge are typically different from these other matrices by orders of magnitude. The methods for faecal sludge sampling are also greatly complicated by the wide range of technologies in each local context, and the heterogeneity within systems.

# Project context

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Another gap in existing knowledge is how to quantify faecal sludge on a city-wide scale, or scales relevant for the design of treatment technologies.

The lack of standardisation complicates the transfer of knowledge and data between different regions and institutions as the results are not comparable. Hence, there is urgent need to establish common methods and procedures for faecal sludge characterisation and quantification.

This book aims to address these challenges and provide a basis towards standardised methods for characterisation and quantification of FS from onsite sanitation technologies, including sampling techniques and health and safety procedures for FS handling.

It also aims at improved communication between sanitation practitioners, comparative faecal sludge database, and improved confidence in the methods and obtained results.

The book will be beneficial for researchers, laboratory technicians, academics, students and sanitation practitioners.

# Sub-grantees

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UKZN (South Africa main grantee)	Konstantina Velkushanova Chris Buckley	Signed
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The importance and need for faecal sludge management has been recognised worldwide. One major gap in developing appropriate and adequate faecal sludge treatment and monitoring techniques is the ability to understand faecal sludge characteristics, its quantification and correlation to source population. Faecal sludge characteristics are highly variable, but as standard methods for sampling and analysis do not exist, results are not comparable and hence the actual variability is not yet fully understood.

Due to the lack of standard methods for sampling and analysis of faecal sludge, standard methods from other fields, such as water, wastewater and soil science are usually applied. However, these methods are not necessarily the most suitable for faecal sludge, and have not been specifically adapted for that purpose. Characteristics of faecal sludge are typically different from these other matrices by orders of magnitude. The methods for faecal sludge sampling are also greatly complicated by the wide range of technologies in each local context, and the heterogeneity within systems. Another gap in existing knowledge is how to quantify faecal sludge on a city-wide scale, or scale relevant for the design of treatment technologies. Moreover, the lack of standardisation complicates the transfer of knowledge and data between different regions and institutions as the results are not comparable. This illustrates the urgent need to establish common methods and procedures for faecal sludge characterisation and quantification.

This book aims to address these challenges and provide a basis towards standardized methods for characterization and quantification of faecal sludge from onsite sanitation technologies, including sampling techniques and health and safety procedures for faecal sludge handling. It also aims at improved communication between sanitation practitioners, comparative faecal sludge database, and improved confidence in the methods and obtained results. The book will be beneficial for researchers, laboratory technicians, academics, students and sanitation practitioners.

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## Methods for Faecal Sludge Analyses

**new**

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# Book content

## Section I: Chapters

### 1. Introduction and Setting the stage: Methods and Analyses

- Introduce the scope of the book; Define target audience; Overview
- Introduce a background of what reader needs to use the book

### 2. Faecal sludge properties

- Define the importance of the different parameters depending on the purpose of characterisation
- Define main group characteristics of FS and their importance for the different FS processing
- How to determine which type of sludge you have
- Selection of different characterisation methods depending on the purpose

# Book content

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## 3. Faecal sludge sampling

- Describe possible sampling objectives (experiment, planned treatment facility, emptying services, test functionality, end-uses, treatment processes, etc)
- Describe how to develop sampling scheme & plan for intended objectives
- Describe chain of command, sample handling
- Explain sampling and data collection challenges (no legal discharge, working with drivers, ...)

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## 4. Estimating faecal sludge loadings (Q's&Q's)

- Provide an overview of an approach to determine quantities and qualities of faecal sludge on a scale relevant for the planning of management and treatment solutions, from community scale to city-wide planning
- Define the six stages in the faecal sludge management service chain where quantities (flows) can be determined
- Introduce the SFD methodology
- Understand significance of a logical method and approach for estimating rates of faecal sludge accumulation
- Understand existing state of knowledge and future prospects



# Book content

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## **5. Faecal sludge experimental methods**

- How to use methods applied in FS
- Describe methodologies to obtain rates and constants needed for modelling of FS systems

## **6. Faecal sludge modelling**

- Review existing FS modelling literature
- Describe processes that can be modelled
- Important parameters for modelling
- Include existing state of knowledge and future prospects on thermal, physical modelling

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## 5. Current developments

- Provide an overview about the current development in the field
- Discuss procedures that are in development but have not yet been verified, or procedures that need to be developed
- Provide guidance of how to:
  - set-up FS laboratories
  - develop a FS database
  - select different FS simulants for specific purposes and what recipes to follow
- Provide an overview of FSM tools
- Provide a summary of the ISO standards for FS treatment – PC305 and community based faecal sludge processors
- Engineering Field testing platform towards commercialisation

## 5. Faecal Sludge simulants

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## **Section II: SOP methods**

- 2 Section 2: Standard operating procedures (SOPs)
  - 2.1 Health and safety
  - 2.2 Quality Assurance
  - 2.3 Sample preparation, handling, storage and disposal
  - 2.4 Sample handling: Storage and disposal
  - 2.5 Transportation of Faecal Sludge Samples
  - 2.6 Chemical properties
  - 2.7 Physical Properties
  - 2.8 Biological Properties

## **Section III: Annexes: Data - pre-existing FS characteristics**