The Flexcretator:
An Improved Pit Emptying Technology with Trash Exclusion

Tate Rogers
Francis de los Reyes III, Walt Beckwith

North Carolina State University
Background

Excrevator

- Auger based system for pit emptying
- Designed to handle dense sludge
- Testing in South Africa, India, and Malawi
Background

Excrevator

• Issues observed during field testing:
  – Rigidity of system made maneuvering within the pit difficult
  – System did not handle liquid sludge well
  – Trash clogging the system
Background

Excrevator

Trash clogging the system
Excrevator → Flexcrevator
Design changes based on field testing
Flexcrevator

Design

• Vacuum system incorporated
  – 90 L tank
  – Pressure can be used for pit agitation

• Flexible, shaftless auger
  – Operated in reverse for trash rejection
Flexcrevator

Design

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Counter Flow Rotation
Flexcrevator

Design

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Flexcrevator

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Sludge
What to do with trash?

• Screen it
  – Will clog, needs high surface area

• Macerate it
  – Needs high rotational speeds, high energy

• “Fluidization and Fishing”
What to do with trash?

Fluidization and “Fishing”
A new way of dealing with trash

TRASH EXCLUSION

• Makes sense to leave trash behind!
  – Contract is typically just for FS, not trash
  – Possible new ways to do business
  – Incentive for behavioral change

• More efficient emptying process
  – Eliminates fishing, possibly also fluidization

• Closed system from pit to transfer tank

• Source separation of sludge and trash
  – Easier downstream treatment
Trash Exclusion

Video?
Flex-X
Flexcrevator Extension- to any vacuum system

Complementary to vacuum technologies
Flex-X
Provides trash exclusion

Connection to Vacuum
Flex-X
Provides trash exclusion

Trash Exclusion Hose
Connection to Vacuum
Flex-X
Small mobile unit
Flexcrevator
Field Testing

• Hyderabad, India August 2016

• 10 Train toilets- Indian railways

• Old method – take apart entire toilet
Flexcrevator
Field Testing

- Hyderabad, India
  August 2016

- Flexcrevator
  – 15 minutes
Flexcrevator
Field Testing

• 8 pour flush latrines
  – With vacuum and auger for trash rejection

• Maximum flow rate observed of 3 L/s
Flexcrevator
Field Testing of Pour Flush Latrines

Flexible hose and auger provided maneuverability
Flexcrevator
Field Testing of Pour Flush Latrines

No trash entered the system
Flex-X
Field Testing

- Blantyre, Malawi
  - Dec 2016, Feb 2017

- Tested with ROM vacuum system

- 12 Pit latrines
Flex-X
Field Testing
Flex-X
Field Testing

- Only one clog after adjustments
- Comparable flow rates with liquid sludge
- Drop off in flow rates with thicker sludge
- Time-motion study ongoing, comparison with old approach
Summary

• Trash exclusion – a new way of dealing with trash
  – can provide several benefits

• Field Testing in India and Malawi have shown positive results

• Optimization and subsequent field testing in spring 2017
Next Steps

**Flexcrevator**

- Reduce weight
- Increase maneuverability of equipment to the pit side

**Flex-X**

- More work into Flexible shaft
- Trash rejection head development

Commercialization
Thank you!

Tate Rogers: tate.rogers@TriEHI.com
Francis de los Reyes: fldelosr@ncsu.edu