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The Power Auger "Excrevator": A Suitable Tool to Empty Pit Latrines in South Africa and Septic Tanks in India?

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The sanitation chain- A Systems View

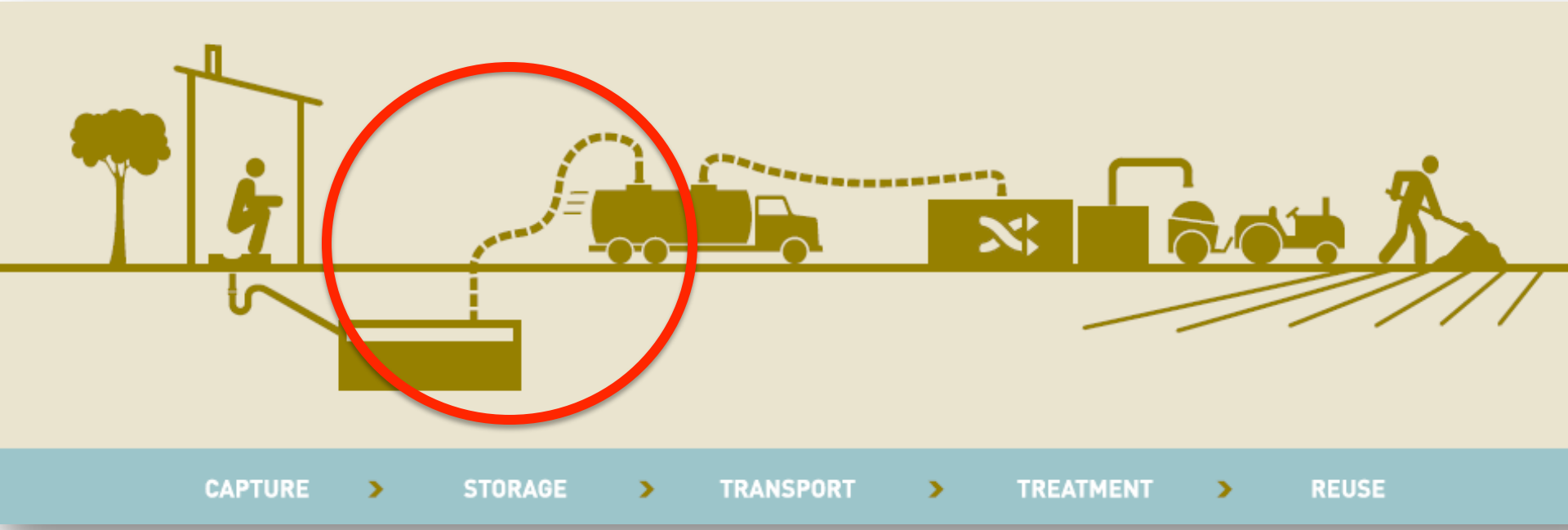


Diagram: BMGF

The dirty business of pit emptying

Photo: Florian Erzinger, SuSanA

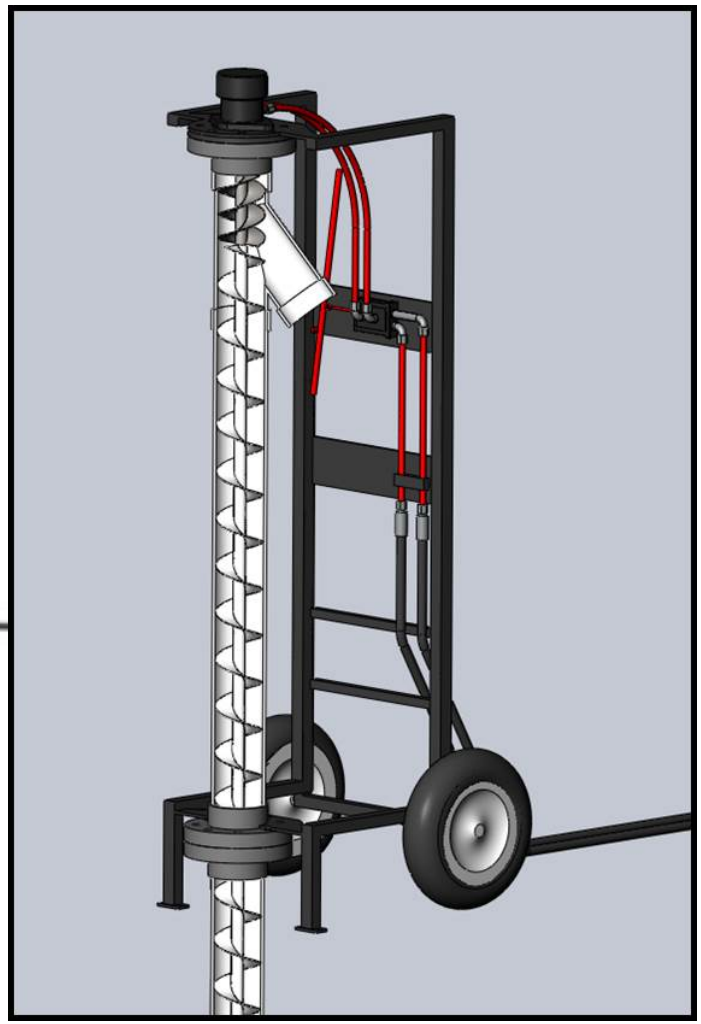
Photo: Dave Still, PID

Gates Foundation RFP

- More pits emptied per day
- Provides hygienic operation
- Easy transport for narrow alleys
- 2 person operation
- Removes heavy sludge/debris from the bottom of latrines
- Affordable, robust, and locally available components
- Low emptying costs per latrine

Photo: Remi Kaupp

The EXCREVATOR™



Version 3

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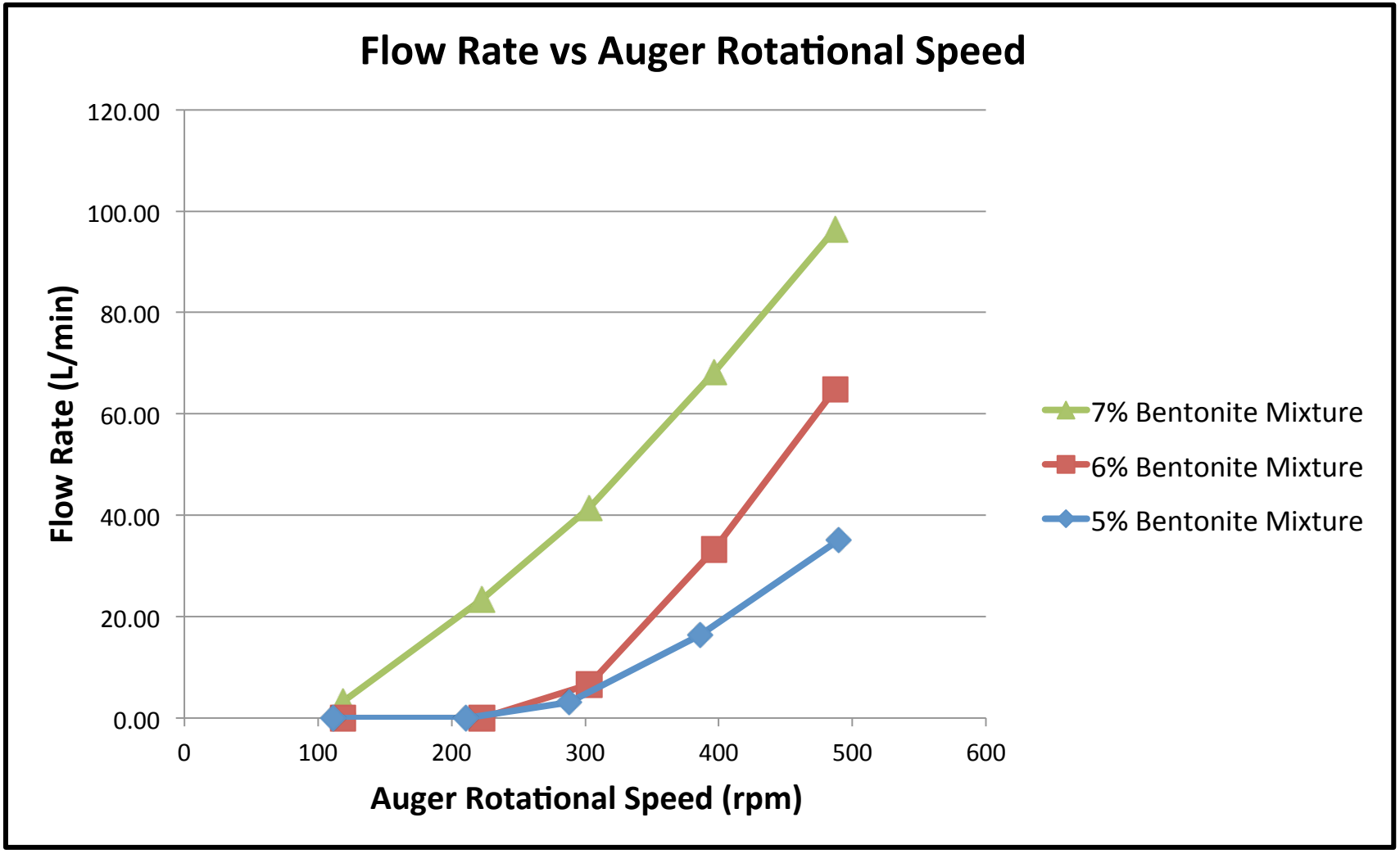
Lab Testing

Results



Flow rates produced for varying auger rotational speeds at 22.5% submergence with three concentrations of simulated waste.

Lab Testing

Results

- Flow Rate and Outlet Pressure increase with viscosity and rotational speed.
- **Flow rates of over 50 Liter/ min (13 gpm)** at typical gas engine speed (300 rpm).
- Submergence has small effect on flow rate.
- Pressure produced at outlet is minimal, so waste cannot be pumped uphill.
- **The Extraction Auger can empty a 1 m^3 pit in less than 30 minutes.**

Cow manure

Excrevator Testing

South Africa, March 2013

Issues and Challenges

Need for characterizing sludge in different kinds of pits

- Sludge strength – e.g., penetrometer
- Viscosity, “Stickiness”
- Presence and variability of layers
- Trash content
- Issue with use of % solids
- Matching pit emptying technology with pits/ sludge characteristics

Next steps for Excrevator™

- Addressing mixing issue (compact layers)
- Addressing trash issues
- Testing in India (Banka Bioloo) - June
- Testing in Malawi (Mzuzu University) – June
- Testing in ZA (UKZN) – July-August
- Potential partnerships in Zambia, Kenya
- Scaling up - 2015

Appendix

References

- Rogers, Tate (2013) Modification of Power Earth Augers for Pit Latrine Extraction in Developing Countries.
- Rogers, T. W., F. L. de los Reyes III, W. J. Beckwith, and R. C. Borden (2014). Power Earth Auger Modification for Waste Extraction from Pit Latrines. *Journal of Water, Sanitation, and Hygiene for Development*, 4:72-80.

Reinvent the Toilet Fair India

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Timeline

- August 2011 – GCE Phase I start
- August 2012 – RTTF in Seattle (Version 1)
- March 2013 – Field Testing in South Africa (Version 2)
- March 2014 – RTTF India (Version 3)
- June 2014 – Field testing in Hyderabad, India
- June 2014 – Field testing in Mzuzu, Malawi
- July – August 2014 – Field testing in Durban, South Africa